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# THE BUREAU

VOL. II. NO. 9

JUNE, 1871





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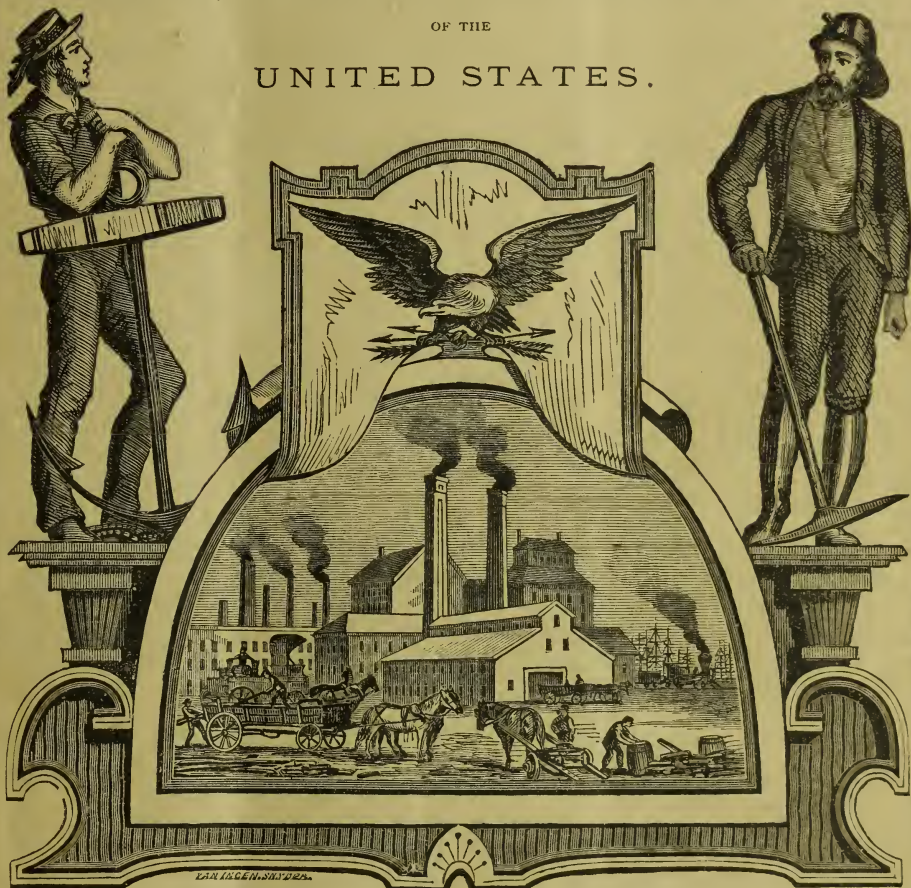
# THE BUREAU

DEVOTED TO THE

## Commerce, Manufactures, and General Industries

OF THE

### UNITED STATES.



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# THE BUREAU:

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## Commerce, Manufactures, and General Industries of the United States.

Vol. II.

CHICAGO, JUNE, 1871.

No. 9.

### INDUSTRIAL COMMUNISM.

Nearly a century ago Charles Fourier advanced a wild, fanciful but brilliant and seductive prophecy, or dream, of the future condition of the world for eighty thousand years. The life of the individual, said he, must be the type of the life of the race. In infancy the individual is wholly occupied with the single phenomenon of growth. Each new day reveals his ignorance, rather than adds to his wisdom. He is content with the means of living, and of sensual enjoyment. He has higher faculties, but they are in a nascent state. Only a few of any race or time become enlightened and full-grown men. These are the philosophers, scientists, statesmen, poets, savans. The rest of the race—the average of the race—are infants. Hence the race, as a whole, is yet in its infancy. If it has lived six or seven or ten thousand years in infancy, and is but now entering on its youth, then a thousand years of the world's life may be accepted as the equivalent of one year of the life of the individual. This being true, we may assume that the race will run its course in eighty thousand years. As the unit-man's advance toward maturity is indicated by an increased power of, and desire for association with, his fellows, and interchange of services and ideas, and especially by a larger and freer association in labor and production, in government, in amusement, in the family, in worship, and in the relations of the sexes, these same tendencies must characterize the advance of the aggregate man—the human race—from its infancy toward its youth and maturity. The theory of the mode of this advance, through increased association, he called communism.

And now the "Commune," so called, is fighting for equality with the government in France, and for weeks has been in possession of Paris. It is a far different commune from the dream of Fourier, as every child differs from its parent, and every

fulfillment of prophecy differs from the vision which the prophet saw—as even Christianity in many of its manifestations has differed widely from the ideal of its founder.

It is destined, doubtless, to be summarily crushed in its present effort. It appears in a form in which it deserves crushing. And yet it may not be amiss to inquire what there is in human nature which tends toward and desires communism.

And first, it is undeniable that the higher stages of religious exaltation culminate in communism. The sect of the Essenes, with whose doctrines those of the founder of Christianity were nearly identical, were an association of communists, as respects property; Christ himself taught that men should "sell all they had and give to the poor," that they should "lay not up treasures on earth," that they should be ready at all times to give to all of all they had, in a manner that if carried out would convert the Christian world into one vast "commune." In the early history of the church we are told that the saints had all their property in common, ate at a common board, and in joining the Christian sect poured their whole wealth into the common stock. Ananias and Sapphira met with the severest punishment for attempting to deceive the Christian commune, by withholding a part while pretending to surrender the whole. To this day the clerical body, as well as the various religious orders, male and female, of both the Greek and Roman Catholic Churches, are communistic bodies within themselves, each member rendering his whole substance to the common fund of the society, and taking upon himself the vows of poverty, *i. e.*, that he will own no property in his own private right, and of chastity, which is implied in the vow of poverty, and of humility; in short, that he will have neither property, wife, nor will of *his own*, but will in all things accept the provision made for him by the

society. In the Catholic forms of Christianity the highest types of religious growth are represented by their "communities" or religious orders of priests, monks, nuns, and brethren of various degrees. In the Protestant forms the highest manifestation of worship is in their "communion," and the most popular and thrilling pulpit appeals are those which exalt the "brotherhood of man," and those duties of indiscriminate benevolence which tend to convert the world into a commune. Indeed, if the commonly accepted utterances of Protestant preachers and hymns were carried into effect, all men would regard themselves as stewards only of their wealth, the Lord being its owner, and the church being the representative of the Lord as to the mode of its use and disposition. This would convert the world into a vast Christian commune or series of communes, which the infirmities of human nature have never permitted mankind to see. Still the language of communism pervades all Christianity, and its members are even called "communicants," which in derivation and literal significance would be communists.

Mormonism is an oligarchic or monarchic commune, based on polygamy and co-operation in industry. The Shaker communities are communes not unlike the Essenes. The Free Love communities at Oneida and elsewhere are distinctly intended to realize the dream of Fourier, by establishing the communal system as respects property, labor and the sexual relations.

Most of the leading industries of the present day in manufactures, transportation, insurance, banking, publishing, and the like, are conducted by joint stock incorporations or financial "communes," in which the share of capital is the integral unit considered in the government of the association, and their owners count according to their number of shares. Trade or merchandising, and the tilling of the soil alone remain to the individual. All other kinds of business are more profitably carried on by the corporation or commune, based on capital. Democracy itself is a political commune, as to all who participate in the right of suffrage; and with this meaning several of our States call themselves (commune or) commonwealths.

The effort to establish a perfect social commune, or association founded on the idea of a free and equal participation by all in the fruits of its common labors has seldom or never succeeded on any large scale, except where its members have been held in union by other than material considerations, or by a powerful religious enthusiasm. But large associations have been formed whose aims were partially communistic, upon less effective

bases. Among these we may mention Freemasonry and kindred orders, trades-unions, guilds; Freemasonry is the guild or trades-union sublimated and idealized. Freemasonry began in the trades-unions between builders and architects in the feudal or middle-age epoch—say from the ninth to the fourteenth centuries, though there is doubtless a foundation, in fact, for the masonic claim that as early as the building of Solomon's Temple, and, indeed, wherever large masses of workingmen were on hire together for wages, they have instinctively combined into associations for their common defense against the demands of employers, and for common assistance, if employment failed. Our modern trades-unions are an important manifestation of the communistic principle, especially since we see them combining throughout Europe and America in the formation of one vast association, the International, with powers so extensive as to insure co-operation on the part of workingmen in Switzerland, to sustain the supposed rights of men in their craft in Scotland or the United States. It is also worthy of note that the leaders in the trades-union movements, and especially in *L'Internationale*, are thorough communists of the Fourieristic type, so far as Fourier's doctrines applied to capital and labor. In the declaration of *L'Internationale*, at its session at Nuremberg, in 1868, is the following, of which the significant points are in the concluding clause:

"It is useless for the working people of one nation to attempt to remodel society: there must be a combination of all the nations, and, meantime, attempts at a forcible revolution ought to be discouraged. The new society ought to be founded on *universal education*. Every individual ought to be developed, by all educational means at the disposal of science and art, into a truly humane being. \* \* \* A society thus prepared for its great task will best know how to legislate for a new order of things. One thing, however, is clear, to wit, that such a future legislation will have to accommodate itself to the economical laws of the age. It will have to render production scientific, and to establish it on the largest possible scale. All new inventions and discoveries, instead of redounding, as now, to the benefit of the few and to the enslaving of the many, must be converted into means of reducing the toils of all, of beautifying life, and ennobling humanity. *All the great indispensable means of existence, as lands, mines, machines, and means of communication, must be the COMMON PROPERTY OF ALL, and must be made so gradually. Nothing can reasonably be private property, but the product of labor, ONE'S OWN LABOR.*"

In harmony with these principles we find the labor unions, almost universally denying that either the corporate monopolies now in possession of the means of transportation, or those which monopolize the privilege of issuing paper money, or that private title to and rent of land, or that interest on loans of capital have any basis in *natural* justice whatever. As these views sound on their first bald statement like



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the ravings of financial lunatics, and as the working men and their leaders, however erratic or imperfect their views may be, are perfectly sane, and many of them shrewd and sagacious from their stand-point, it is better to study the process by which so large and influential a portion of the working classes of the civilized world came to have these singular views, than it is to dismiss them as "bosh," in the high and haughty style in which the Bourbons of every age treat its revolutionists and workers.

The total membership of these unions can not be stated with precision. The leading unionists in Great Britain estimate their present members at about 850,000 for that kingdom. These members would sustain directly, by their labor, about 5,000,000 souls, or one-seventh of the whole population. In the building trades about 900,000 persons are employed, of whom only about 100,000 are members of the various masons', plasterers', and carpenters' unions. In the city trades, however, from seven to nine tenths of the employes are in the unions. The Amalgamated Society of Engineers, Machinists, Millwrights and Pattern-makers had, in 1867, 34,000 members, belonging to 308 branches located in Great Britain, Ireland, France, the United States, Australia, New Zealand, Canada, and the West Indies. It had a cash balance of \$576,785, and an annual income of over \$380,000 in its treasury. Its influence has been so wisely directed that nearly all its disputes with capitalists are successfully arbitrated and since 1850, strikes are almost unknown. Indeed, the larger the growth and the more perfect and powerful the organization of these unions the more peaceful become their tendencies as a rule. The amalgamated carpenters number 8,000 members, 187 branches and has a fund of \$70,000. The operative masons number 18,000; the bricklayers, 12,000; the plasterers, 8,000; the general union of tailors, 12,000; iron-founders, 12,000; boiler-makers, 9,000; London tailors, 7,000; Scotch carpenters, 5,000; power-loom weavers, 5,000; locomotive engineers and firemen, 15,000, with 64 branches and an annual income of about \$35,000. These societies are not federal but individual, so to speak, nor must it be supposed that the large funds they gather and disburse are used wholly in aggressive movements. By far the larger portion of their dues are applied to beneficent purposes. Up to 1866, for instance, the "Amalgamated Engineers" disbursed (a period of 15 years being included) \$2,443,585, of which amount \$1,399,200 had been devoted to assisting men out of work, including those "on strikes." No more than a third of this went directly to the latter purpose, while \$1,024,385 is reported as expended directly

for such objects as sickness, superannuation, accidents, funerals, etc.

Then there are the federated unions and councils, which arise from the attempts of various trades to combine for purposes common to all.

The "Miners' National Association," an affiliated group of societies has a membership of 50,000. London, Manchester, Birmingham, Wolverhampton, Sheffield, Glasgow, Leeds, in fact, all the great manufacturing centres, have local trades councils or conferences, meeting regularly and representing from 3,000 to 100,000 men respectively. A number of general conferences have been held at Sheffield, Preston, Manchester and London, in which the attending delegates have represented all the leading trades and from 200,000 to 400,000 members. A well-informed writer in the *Atlantic Monthly* for May, from whom some of the above facts are taken, adds: "From a careful examination of parliamentary and other returns made in 1867, I estimate that at that date the wages class in Great Britain had accumulated funds to the amount of \$437,216,660 specie. This vast sum belonged to the various co-operative, friendly, benefit, building, loan, and other similar societies, to the trades-unions, or was deposited in the various savings banks. About one-half was in the latter institutions. The basis of this calculation includes only those deposits and investments belonging to those who receive wages. If the workmen of England and America could once be made to realize the enormous power involved in such an aggregation of their small means, it would not be long before the character of the whole contest between labor and capital would change; the former would become self-employing, and the latter would seek opportunity to invest with it at moderate interest.

"No very accurate estimates can be obtained of the Continental trades-unions membership, for nearly every European government has had these organizations under open or secret surveillance. Italy has a very complete network of semi-political trades societies, of which Garibaldi is the honorary president. It numbers about four hundred and fifty branches, has a membership of about one hundred and twenty thousand, and a fund of about three hundred thousand dollars. In Italy strikes have been quite frequent during the last five years, as also in France, Belgium, and Austria; in each of which countries the combination laws have been greatly modified. But this aggressive activity has been promoted by the growth of the international movement and the energy of its propaganda. In Spain four thousand workingmen's societies are reported. They form the

principal sources of the republican agitation there. In Denmark and Sweden the agitation is just beginning to make itself perceptible, and but recently, even in Asiatic Turkey, I read of a formidable strike occurring."

The crowning effort of the labor unions is the formation of the *Internationale*, whose character is of special interest at present from its supposed connection with the Paris communistic rebellion. The same writer says: "Henri Rochefort may be at present considered the political leader of the labor movement in France, though there are a number of able workingmen who are more directly its representatives. As to membership, about one-third of the English trades-unions have connected themselves more or less directly with the International Association. In France, 433,785 unionists are co-operating; in Switzerland, 42,326; in Germany, 150,000; in Spain, about 20,000; in Austria and Hungary, 100,000; Belgium has an affiliated membership of about 20,000; Italy, one of at least 100,000; while in Holland, Denmark, and even Russia, there are sections organizing. The American National Labor Union, with its membership of over 200,000, is in full sympathy. A great deal of sympathetic affiliation exists in Poland, Russia, and other countries, which has found expression at the different congresses only through independent delegates, who are able to defy the government opposition."

Recurring to the socialistic principles which underlie these unions, and which are fully believed and with great unanimity advocated by their leaders, we cannot fail to perceive that they are a power of extreme importance, and however abortive their first efforts, as the Paris rebellion, may prove, they cannot fail to exercise a vital influence over the history of this century and the next. Yet it is hardly fair to hold communism as a principle responsible for the Paris rebellion, though doubtless the communists and workingmen's orders, all throw their whole strength into it. But they do not stand alone, nor are their socialist theories shared by, perhaps, a majority of the "Reds" of Paris. They could not control the National Guards, for they denounce a standing army as even more dangerous than an established priesthood, and, while not slow to precipitate a bloody struggle on very loose and ill-defined grounds, they are, like most revolutionists and zealots, the professed apostles of peace; opposing war as equally iniquitous on both sides and under all circumstances. Both in Germany and France, their organization opposed the recent Franco-German war as an unnecessary monarchical butchery, and has gained great popularity by the popular concurrence in its position.

The element of power which attracts the revolted National Guards and no small portion of the people of Paris to the standards of Blanqui and Rochefort, is the demand, by the city, of the right of self-government, and by the National Guard of the privilege of electing its officers. This "separatist" feeling between Paris and its army on the one hand, and the peasantry of the rural districts on the other, is partly a passionate repugnance, the result of great unlikeness between the city and the provinces, and partly a political sentiment corresponding closely to our sectionalism, or "State rights."

While these influences culminate in Paris, they are strong in Marseilles, Lyons, and the other large cities. They earnestly desire the right of local self-government, or, in their phrase, to be "free cities," confederated with France, but not dependent on France for their legislation. They ask that a treaty shall be entered into between these cities or communes, and the rural government of France, whereby they shall be free from the burden of a consolidated national despotism, whether it be republican or imperial. The cities of France, and Paris above all, present in their social characteristics the strongest possible contrast to the country. Paris is the gay centre of amusements for foreigners from the whole world. The French peasant, and indeed the true Frenchman everywhere has no liking for foreigners, and requires very little amusement. The Parisian is a man of the world, extravagant and dissolute. The rustic Frenchman has strong family ties, is frugal, hard-working, and intent only on enhancing his means out of the small savings that result from business pursued at close profits against great competition. Paris is fast, brilliant, wicked, and debauching. Rustic France regards the capital as the maelstrom where virtuous youth are drawn down to perdition. They both fear and hate Paris, and will kiss one foot of the tyrant themselves if he will but plant his heaviest heel on the Parisians.

Paris, with all its science, fashion, progress, and theories, pants to burst from the domination of the mailed despots imposed upon her by the peasantry, by the standing armies which they recruit, and the imperial humbugs whom they maintain in power by bayonets and votes. If we had no State lines, and New York had hitherto been governed by a mayor appointed by the President, assisted by the national army; if she had at last struck for self-government, and were now calling upon Boston, Philadelphia, and Chicago to join her in the effort to erect some barriers between them and the consolidated despotism of the central power, the case would have some of



the features of the Paris rebellion. It is, in great part, a struggle between the cities and the country. The former demand a federal system and autonomy; the latter demand a united republican or monarchical empire. This is the reverse of the unity that is growing in Germany and Italy, and even in the United States. But, in our sympathy for unity in Germany, we have no need to turn a deaf ear to the cry of France for that very system of federalism which we, a few years ago, so exclusively admired. Each principle has its advantages and evils. France has been crushed by enforced unity, under which her people grew more and more unlike and repugnant. Germany has been torn by the severance of her petty governments until she has learned to yearn for unity and an empire.

The two peoples are moving in opposite directions, just as we moved toward State sovereignty and secession until civil war drove us back toward consolidation and national unity. France has had too much of governmental unity. Her longings for local and municipal freedom should be respected. Especially should our own government, founded as it is on a wise attempt to unite local freedom with national unity, lend a quick ear to the cry of the French cities for federalism against centralism. The movement may have dangerous or incompetent or bloody leaders, but they can scarcely be worse than the minions of Napoleon III. It may include men of ultra and utopian theories, as do all revolutions. But if it embodies a principle essential to the success of republicanism in France, and to the welfare and liberty of the French people, it is entitled to the patient forbearance of all true Americans, and of the friends of political progress everywhere.

While these movements toward communism are extending among the proletarian or wage-working classes, the evil effects of ultra-individualism among the capitalist class, the landholders, bondholders, and manufacturers in England, are accelerating the onward movement of socialism in Great Britain with a greater power in fact than appears on the surface. British legislation is a monopoly of the land-holding capitalists, reinforced by a few, very few, bondholders and manufacturers. The British government is essentially a plutocracy, and the rule of capital is administered with a single purpose to keep capital in its present hands. The leading economist of Great Britain, Mr. J. S. Mill, is president of a Land Tenure Reform Association, the cardinal doctrine of which in relation to title to land is as ultra as that of the Paris communists or of Fourier himself. The theory of this association is that land derives its value, not in any considerable degree

from the labor or capital expended on it by its possessor or owner, but from the effects of the aggregate movements of society, including the whole commerce, manufactures, agriculture, and means of transportation which may be carried on in the country in which the land is situated, and in other countries, in more or less distant relations to the land in question, so as to render its location available for an increased number of uses, consequently to render it sought after by an increased number of competing purchasers and renters, and hence to raise its money value. Thus a more cheap and rapid production of cotton in the Southern States may form the chief occasion of its expanded manufacture in Manchester, England, and in Marseilles, in France, and so may add twenty-fold to the selling value of the land in those cities, or in certain parts of them, which would not be built upon at all were it not for this enhancement in the production of the raw material. Yet this production may be a no more important cause of the rise in value than the increased consumption of cotton goods by Russian serfs and American farmers, or than the suspension of cotton manufactures in Ireland and India under the combined effects of hostile English legislation and competition.

Thus it is that the value of land results from two sources; viz.: first, the capital and labor expended upon it by its owner, or which would have to be expended on it to put it in its present condition of productiveness; and, secondly, the influences of the societary movement which may make it central and important for the uses of production and exchange, or may leave it high and dry in its solitude and desolation, ten or fifty miles away from the nearest human habitation. This societary movement makes the whole difference between the value of the lot of land on the corner of Wall street and Broadway, which is worth millions of dollars, and that of a lot of similar size on Itasca Lake or in the White Mountains, which may not be worth fifty cents an acre. As the societary movement gives all of its value to real estate, except that which results from the improvements put on it, there is some ground for holding that society ought to have some interest in those values of land which are the product of its aggregate labor. The difficulty is to carry out this revolution without bringing the societary movement itself to a complete standstill, so as utterly, or nearly, to destroy the values which the Land Reform Association would seek to diffuse.

In America, where land is endlessly subdivided, universally diffused, gives little or no political power, is bought and sold as freely as merchan-

dis; where its title can be readily ascertained by a few hours' examination in a county record office, and in another hour, at a dollar's cost, can be transferred to any buyer; where entails are impossible, subdivisions of the fee into various life estates and by various trusts, powers, and uses are substantially unknown, and where, in short, we have perfect *free trade in land*, and are ready to give a quarter section to whomever will move on to it, we feel no need of land reform. But in England, where one hundred and fifty land-owners own half of the kingdom, and less than a hundredth part of the population own the whole; where the possession of land gives control of the government and *entree* to all the wealth, power, and social position of the kingdom; where its title may be entailed and tied up during any number of lives in being, and for twenty-one years after the entailor passes out of the world; where no system of registration enables a purchaser to buy even where he can find any one willing to sell; where a series of friendly lawsuits are necessary to enable C D to convey land voluntarily to A B, and A B must encounter the same embargo of costs and obstacles when he desires to convey it to E F; where the large estates are required by primogeniture to go to the eldest only, and the eldest, by intermarriage, are constantly consolidating these great estates, and making them fewer and larger; where less and less land is being left for cultivation each year and more and more is taken for parks and forests; where the diminishing area for the production of grain and vegetables tends constantly to make bread and potatoes more dear and flesh and blood more cheap; where, in short, the principles of the American Indian control the owners of land and the owners of land dictate the policy of government, and through it the price of bread and the pauperism of labor—there, it is not too much to say, first, that the selfish meanness of individualism, as exhibited in the exclusive policy of the aristocracy, is more destructive of life and labor than any of the extravagances of socialism; and, secondly, that the yearly increasing incubus of these wrongs is becoming itself the burden which must break down the system itself and sweep it away forever. The position taken by the land reformers at present is one of compromise. They offer to allow the land-owners to remain in possession of their present acquisitions at their present value, but to regard all future increase in these values as the property of the state.

Mr. Mill himself, in a recent explanatory statement of the programme of the Land Tenure Reform Association, says:

"The society are of opinion that in allowing the land to

become private property the State ought to have reserved to itself this accession of income, *i. e.*, the unearned income from natural causes, and that lapse of time does not extinguish this right, whatever claim to compensation it may establish in favor of the land-owners. The land is the original inheritance of all mankind. \* \* \* The society does not propose to disturb the land-owners in their just acquisitions. But they assert the right of the State to all such accessions of income in the future. Whatever value the land may have acquired at the time when the principle they contend for shall obtain the assent of Parliament, they do not propose to interfere with. If, rather than submit to be specially taxed on the future increase of his rent, a land-owner prefers to relinquish his land to the State, the society are willing that the State should pay for it at its selling value. By this provision all his just claims will be fully satisfied, while the bargains will still be highly advantageous to the nation, since an individual never gives, in present money, for a remote profit, anything like what the profit is worth to the State, which is immortal. \* \* \* The State will receive the entire rent of the lands voluntarily sold to it by their possessors, together with a tax on the future increase of rent on those properties whose owners have sufficient confidence in the justice and moderation of the State to prefer retaining them."

This position, like all compromises, is illogical in conception, and would prove difficult of application. For if the government is to regard the increase in the value of lands as the property of society, it ought to regard the future decline in values as an individual loss for which society should compensate. Whenever the reform shall become feasible at all, it will be feasible on the basis of regarding all the value which land derives from its location as belonging to society at large, and all which arises from the improvements created on it as the private property of the owner. It is not for us to imagine how such a theory can be carried out without deranging all rights of real property and destroying the inducements to labor. We seek only to refer to the tendencies and demands of socialism and the causes in which they originate. Without doubt, the monopoly of land in England is an evil of individualism or selfishness at once gigantic, unjust, and so difficult of reform, save by a complete social revolution, as to favor the growth of communistic ideas in England, on this question at least.

While in England the evils of the monopoly of land by a few lead to the growth among the landless masses of the most startling socialistic theories, in America, where the land is free, and only the means of getting over it are the subjects of monopoly, we find the same tendencies among the masses to hold that all railways and canals should be the common property of the people. It is as difficult to see how we shall make them so, without a general act of sequestration, as to see how Mr. Mill's Land Tenure Reform Association can make the future increase in the values of lands there the common property of the whole



people. Nevertheless this obstacle does not prevent American railway reformers from declaring that the railways are common highways; that the people at large, through their legislatures, have the right to control them, and that, in effect, the corporators are only the trustees of a public trust. This is in spirit the declaration made by the new Illinois constitution, and something like this ground must be assumed by the people throughout the country, if they do not wish to have our government converted into a plutocracy, controlled by the railway barons, as Great Britain is a plutocracy controlled by the land barons. Society is beginning to discover that the values of railway properties, like those of lands, are created more by the societary movement than by the efforts of the corporate owners. But this does not explain the method by which society at large may distribute among its own members more equitably and beneficially the values which now go to swell the stock-books of our railways with constant waterings and new issues, or how they may retain the benefit of all this increasing wealth in the hands of its involuntary donors, by compelling the railways to reduce their freights and fares. Thus we see that wherever monopoly becomes oppressive its tendencies are to develop the antagonistic principle of socialism, and hence that socialism or communism is most agitated where individualism or organized selfishness and monopoly rises into the most complete ascendancy. As our telegraph system becomes oppressive we propose the communistic remedy, of having the telegraph business run by the government. Indeed, in the broadest sense, communism may be defined as including every attempt on the part of mankind to promote the interests of the masses of men as the primary means of promoting that of the individual. Not that the communist prefers the interest of the mass to his own, for this is not in human nature, and cannot be put there. But communism recognizes the instances wherein the interests of the mass and of the individual are the same, and seeks to promote the latter through the former. It includes in the abstract, therefore, every public-spirited, democratic, and co-operative, as well as benevolent, mode of action, as distinguished from those which are monarchical, exclusive, and proceed by strictly selfish means.

The co-operative stores in Rochdale and other points in England, and the co-operative banks in Germany, are the most advanced experiments yet extant in the effort to apply the principles of communism to productive industry, disconnected entirely from any religious enthusiasm as a bond of union to hold the co-operators together. It is now demonstrated that a thousand, five hundred,

or even a hundred, consumers of groceries, dry goods, or hardware, can organize without capital, and by their organized union obtain a power which has the force and credit of capital; if properly managed, can buy at the lowest cost of manufacture and importation the goods they formerly bought at the highest retail prices, and out of the profit thus made, after paying fairly for the services of those who conduct the business, they will accumulate rapidly a large co-operative capital in hard cash, and will obtain the goods for their immediate use at a rate so much lower than the rates previously paid as to substitute luxury for comfort, and comfort for squalor, in every home. The secret of the expanding availability and power that co-operation may develop lies in the fact that the sole use of capital when employed in business is to effect the co-operation of large bodies of men in the labors incident to the business; that this capital is in a very great degree only credit; that the credit is theoretically possible of attainment through the co-operation without the capital; and that where it is so obtained the capital itself is unnecessary. While in theory co-operation gives credit and becomes for some purposes a substitute for capital, in practice it involves a higher average grade of education among the wages working classes, and a greater trustworthiness among their agents and managers, than usually prevails. But all trustworthiness and credit are results of habit and civilization. They develop naturally, as men acquire the general sagacity to perceive the whole profit and advantage they confer. All classes of mankind are steadily growing in their ability to substitute credit for capital and to manufacture credit by co-operation and association. Co-operation in the management of households in cities—as, for instance, of fifty houses on the same block—might be inaugurated so that the food for the entire fifty families would be prepared in one kitchen, at a saving of the wages of at least thirty-five cooks, of the rent of eighty per cent. of the kitchen-room, of the purchase of nine-tenths of the present kitchen furniture, as well as of one-third of the present cost and waste of the food itself. It might be made the means of substituting good cooking for bad, of escaping from the annoyance of servants and dependence on them, and in all ways would diminish the cost of housekeeping one-half, while promoting its comforts. Of course, the same advantages would grow out of the establishment of a common laundry, a common tailoring and dress-making shop, and so on. How much more cheaply and economically are we now served, through co-operation, with the tuition for our children, than if each family must hire its teacher. And only by co-

operation can we sustain stated religious services at all. But by co-operation we can be preached to by a Beecher or Chapin or Channing, or a bishop or archbishop, for less money per week than under the individual system we can get our meat and potatoes cooked by Bridget. What would become of Christianity and education if their dispensation required the services of a preacher and teacher in every house? And why can we not cheapen our steaks by the same means by which we consent to cheapen our religion? If we can take our theology from a common fountain with Smith, Jones, and Robinson, why not our salads?

Notwithstanding some of the fantastic vagaries of Fourier, it is undeniable that the progress of the present century has consisted thus far, in great part, of the fulfillment of the ideal which his imagination projected.

Men have learned fully that one thousand men, working in co-operation with each other, instead of producing merely one thousand times as much as either would produce alone, may produce a million or billion times as much—indeed, may produce such things as printing-presses, printed books, newspapers, railroads, cities, etc., which, by the operation of men working singly, would never be produced at all. But man's power of enjoyment is increased by association, and the aggregation of large numbers of men in masses, in a degree perhaps even greater than his power of production. The chief attraction of war, as well as of military parades, civic and religious processions, politics, legislative assemblies, public worship, rituals, public parks, boulevards and promenades, drives, watering-places, balls, parties, shopping, operas and theaters, and even of life in cities generally, compared with rustic life, consists in this pleasure of aggregate association. Man has a sixth sense, which is neither sight, touch, hearing, taste, or smell, a sense of the pleasure of being surrounded by his fellow-men and of sustaining certain social relations to his fellows. In those in whom this social sense is strong every dollar of income will produce more pleasure than ten dollars would produce out of society.

The problem of the future is how far human progress from henceforth is to consist in an increase in this power of association, and is to work a relaxation in the exclusiveness, selfishness, and monopoly which has heretofore governed the laws pertaining to property and to social life. With every advance in the civilization of industry there has been an increasing tendency, through corporate and other associations, to use in common a large proportion of the property of the community. Is this tendency to grow until associated masses,

and finally the associated mass, shall own the railroads, the mines, the manufactories, and the land; until private owners shall own merely the passing product of their labor? Is this an absolute tendency toward socialism, or is it merely one of two parallel tendencies, and is the tendency toward individualism as marked in other directions as that toward socialism is in the directions we have named? With every increase of association thus far, famines have disappeared, the ability of men for self-support has been equalized; hours of labor have shortened; universal education has become possible; democracy has become tolerable, not to say preferable. Woman has become more equal with man and self-dependent. The subjection of one individual to another, whether of child to parent or teacher, of wife to husband, of the citizen to the officer, the tenant to the landlord, the borrower to the lender, the workingman to his employer—all have been mitigated or abolished. Marriage has become almost a matter of voluntary association in theory and wholly so in practice. Are the associated energies of mankind to go on increasing in their power and productiveness, until, having tunneled the Alps and channeled Suez, we shall also, as Fourier predicted, irrigate the Sahara with the waters of the Nile and Niger, and render the deserts of Africa the garden of the world. Are we to go on peopling the earth and subduing it, mollifying its climate and warding its evils, until wheat-fields shall wave along the now frozen seas, and the steppes of Siberia shall bear a population as numberless as the plains of Europe? Are hours of labor to be shortened to six, four, or three, as heretofore they have shortened from sixteen to twelve, ten and eight, and the aggregate product of industry to conduce more and more to the aggregate comfort of man? If so, it is easy to perceive that the earth's population must be wending slowly toward a period in the centuries, far, far ahead, but still approaching, when those Christian precepts of universal generosity and unselfishness, which seem now to have been framed for no time, shall then appear to have been made for all time. It will not then be necessary to complete the revolution, that those fanciful cosmical changes which Fourier predicted concerning the physical conditions of the earth shall transpire, though, as a broad philosophical generalization, it may be safely assumed that as earth itself has been passing through changes for myriads of ages, each one adapting it to a higher and more numerous order of sentient existence, so its future transformations will in some way increase its productive powers, refine its beauty and widen the circle of its habitability.



Only the imagination of a poet-philosopher would affirm that the aurora would brighten into illuminating and heating power which would renew at the poles the climate of the tropics; that the seas would be filled with aqueous life and vegetation that should impart to them beauties now unknown; that the whole physical complexion and tone of the earth's surface should be redeemed from the curse of selfishness and labor and restored to the Eden of ease, fertility, luxury, and beauty. All this may read pleasantly in the dream of one who ventures to predict the world's future for eighty thousand years. But common, unpretending reason sinks back appalled from the abysmal rashness involved in any effort to tell even what an hour may bring forth, still less to trace, as the egotistic and imaginative Frenchman has done, the rise of the human race to its acme of associated productiveness, of numbers and of acquisition, and its subsequent decline into a condition not superior to its present, and finally into barbarism, savagery, and desolation. If it is not ours to enjoy its culminating splendors, we may at least rejoice that we are spared the misery of its period of retrogression and decay. Above all, we shall not be witnesses of the returning chaos, when again the universe shall be "without form, and void and darkness shall be upon the face of the deep."

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## THE FREE TRADE DOCTRINE OF PRICES AS AFFECTED BY IMPORT DUTIES.

(Continued.)

BY DR. WM. ELDER.

In our April number we pressed the free trade principle of duties reflected upon the prices of domestic competing products to its consequences, and found it a capital subject for the *argumentum ad absurdum*. We closed the exposure of the prevalent sophistry with a promise to examine the workings of protective duties upon the prices of commodities put under their influence.

To clear the subject of the confusion produced by the use of ambiguous terms, we offer the definition of those which we shall use in the treatment, that is, we fix, for our own use, the limits of their application. By *tax* upon commodities we mean a charge imposed by the government which the *consumers* must pay—whether it be an excise charge upon domestic products, or a revenue duty upon foreign imports. Thus the very heavy import duty laid by the British government upon tobacco and sugar is, in its nature and in all its effects, an excise tax, collected at the port of entry, which falls entirely upon the consumers, and does not otherwise affect the foreign producers

than as it may have the effect of diminishing their market in England. Whenever these articles are bought in England for consumption there, the whole charge of the import duty falls upon the consumer, just as any internal or excise duty does upon native products. The same thing is true of our import duties upon tea and coffee, and the like articles, which we do not produce. In all such cases, here and there, and everywhere, the import duty increases the price to the consumer exactly as many dollars or cents, or pounds or shillings, as the government charges upon the imports.

A tax being thus understood to be a charge, which the consumer must in all cases pay, and pay to the full amount of the charge, a *protective* duty cannot be called a tax, for the reason that the consumer of the article so charged may not have to bear or pay it; he may be relieved of a part or of the whole of it; in other words, the *price* may not be enhanced to him by its whole amount, or by any part of it—nay, by the proper operation of such a protective duty, the price of the commodity may be actually lessened to the consumer; and so is not a tax in our sense of the word. Nor can it, with any logical exactness, be called a tax upon the foreign producer, when the duty is thrown upon him, because he is not a subject of the government which imposes the duty upon his products. If either of these results are only possible or probable, it is best to avoid the bias that misused words give to our reasonings by using the distinctive phrase "protective duty," until it be proved that it is in effect a tax, such as excise rates always are. The candid student of our subject will see the necessity of keeping the proposition open and clear of all prejudgments until the conclusion is fairly reached; and the prejudiced opponent must feel that this position must be allowed us, however much it endangers his favorite mode of arguing the question.

Another preliminary point must be cleared before we can proceed: PRICE is not a fixed, stable, invariable thing. Stated at a given amount in money value to-day, it cannot be assumed as a standard or basis from which to infer the effect of any modifying influence which may fall upon it to-morrow. Price is not value; it is the power of an article to command money or exchange; and it may be altered materially, and put either higher or lower, by any one of a hundred causes. The necessities of the vender, his pressing want of ready money, may reduce it; a mere guess at the probable supply in market a month hence can either raise or depress it; the policy of crushing a rival producer may put it below cost to the holder of the commodity; scarcity or abundance

of money or of exchange products in the market will greatly affect it. One need but reflect for a moment to feel that prices are the subjects of a thousand influences, including whims, fashions, and speculations, as well as necessities. Indeed it would be a mere waste of words to argue this proposition, but for the rather surprising fact that our opponents talk as if the imposition of an import duty of, say, twenty-five cents to-day upon an article which yesterday cost the consumer one dollar, must necessarily raise its price to one dollar and twenty-five cents exactly.

Suppose, however, that such article cost the vender only fifty cents, and gave him a profit of fifty cents yesterday—a very possible thing. May he not, just as possibly, sell it to-morrow at one dollar, bearing the impost duty himself, in abatement of his former profit? Cannot competition in his market, suddenly sprung upon him or only threatened, do this? Cannot the danger of wholly losing the market put him to the necessity of selling his goods down to the lowest price that will pay production? Are we going too far in saying that foreign producers may sell even below the cost of production, for as long a period as they can escape bankruptcy, in the hope of crushing out a domestic rivalry, and repairing all losses afterward, when the field is cleared for their monopoly?

If we are called upon for the proof that this bold game has been more than once played upon us, we are ready to produce it. But what need of instances? Has not every one seen an old line of stages or steamboats carry passengers for nothing to drive out the rivalry of a new line that had less capital to endure the struggle? And is there not a fair probability that a policy of protection extended to a domestic industry which threatens to seize the home market may have the effect of lowering, instead of increasing, the price of a foreign import exposed to the danger of expulsion? This point need not be further pressed, except to call attention to the fact that the absence of domestic competition is the very condition of things which leaves the prices of imported goods to be fixed by the producer, just as best suits his own interest, enabling him to throw all government burdens upon the consumer, and hold our markets free of all incumbrances and abatements of his profits; for all taxes, under whatever name, are in such cases a charge that goes into the prices paid by the consumers. But protective duties are levied for the very purpose of *raising* prices to the point at which native capital and labor can successfully contend for their own markets! Yes, or else they would fail the intention of their imposition. What

is the objection to this intention? Should not home labor have its opportunity of choice among the occupations which bring wealth, with all its blessings, to the laborer? Should not domestic capital and enterprise be secured in their opportunity of employment, at once profitable to the holders and to the nation? We emphasize the words raising prices of commodities for the intimation which they convey that, in the face of foreign competition, they are below the remunerative rates which by our standard of living are required. Such raising of rates must be done, or the home labor must be excluded from such employments. Our markets must be defended from foreign invasion, or our choice of industries must be abridged. Free foreign trade does stand in the way of free home enterprise. Here is a *freedom* more important to a nation than all of that kind for which nations tax themselves up to the cost of all their expenditures in war, and all their securities in peace: it is the freedom of labor, from which all wealth springs, and on which all prosperity depends. If protective duties were a tax, and only a tax, upon the nation that adopts them, might they not pay as well, or better, than any other charge which the general welfare demands?

This aspect of the question lifts it out of the sphere of market-house logic, and gives it the character of a system of productive *power*. But our debate is with Free Traders, and it would make them giddy to carry them out of the domain of a huckstering system of trade; and we return to meet them on their own level.

Protective duties are designed to raise prices, in the first instance. Suppose we grant this, though the statement is a little too strong. They are, more correctly, designed to set the industry and enterprise of the people *free* from the restrictions imposed upon them by a competition hostile to their liberty. They are designed to secure the choice that the people should have between the more and the less remunerative, educational, and elevating forms of labor; and through such diversification of labor as they are entitled to enjoy, to establish the industrial independence of the nation, and find suitable employment for every diversity of physical power and intellectual talent which the community embraces—in a word, to secure work and all its rewards to every capable individual in the nation. But there is one other thing which protective duties do, besides raising prices, for such noble and necessary ends as they serve: they *hold prices down* to the fairly remunerative rates which every man in the nation is concerned to assure to the consumers. Under a well-sus-



tained home production, the foreigner can never exact more for his goods than home labor can afford them for; nor can he injuriously govern the supply, in either peace or war. We say that protection holds down prices to the fair rate which domestic labor deserves. Above such rates they cannot go, for domestic competition will not permit monopoly prices to any protected industry. If undue or unequal profits result to the protected employments, home labor and capital enter the field and lower them to the standard rate. Thus, protection abates, at once, the evil of foreign monopolies and fluctuations of price and of supply, and distributes its advantages at home equitably in the free rivalries of industrial enterprise.

Free Traders have a couple of words which they couple as other bad boys tie two cats together by their tails—manufacturers and consumers. In their political economy there are just two classes of men and only one class of things in the world. Their one idea of trade allows no more. A few hundred greedy capitalists and about forty millions of consumers is their census and classification of the United States, and these two classes are wholly, utterly and deadly distinct from each other. The one class of things is commodities ready for ultimate distribution and consumption. They never touch an industry until it has done its work and gone to market.

But is there only about one producer in the nation to every ten thousand consumers? And are not the consumers producers also? And has not every man, woman and child among us a direct interest in abundance of work, and the highest wages that the general system of business can afford? Let us have peace; above all, let us have the truth of things, and the service of common sense in our theory of business.

And now let us lay in a new stock of patience while, on the Free Traders' level of thinking, we look at a few facts, among thousands, that exemplify the workings of protective duties upon prices of foreign imports, and their reflected effects upon domestic products of the like kinds:

In 1844 the duty on English common bar-iron was \$25 per ton. The price in New York (average of the year) was \$61.83. The cost less the duty, it is assumed, would have been \$36.83. The duty, in *ad valorem*, was therefore 68 per cent. The price, less the duty, we will call the prime cost, for the purpose of our demonstration. The rates of duty were twice lowered between 1844 and 1860. In 1846 the duty was reduced to 30 per cent. *ad valorem*, and in 1857 to 24 per cent. Did the price fall in proportion, and were the

consumers as much relieved of the *tan*? See the following statement:

|                |                   |                 |         |
|----------------|-------------------|-----------------|---------|
| 1844, duty.... | \$25 00 per ton.  | Prime cost..... | \$36 83 |
| 1854, " .....  | 16 42 " " " ..... | " " .....       | 54 70   |
| 1858, " .....  | 10 04 " " " ..... | " " .....       | 41 85   |
| 1860, " .....  | 8 23 " " " .....  | " " .....       | 34 23   |

Here we see that at the first stage of diminished rates the duty *fell* \$8.57 and the prime cost *rose* \$18.37. At the second stage, when the duty had fallen \$14.96, the prime cost was still \$5.52 higher than in 1844; and when the duty had been reduced \$16.78, the prime cost had fallen but \$2.60.

Take another instance: In 1845, under the protective tariff of 1842, the duty upon pig-lead was \$3 per hundred pounds; the price in the New York market (average of the year) was \$3.37½. The duty being 800 per cent. upon the prime cost, or, as the Free Traders argue, the lead might have been had for 37½ cents, duty off, and the reflected effect upon the domestic product, protected by an 800 per cent. duty, was a tax of \$3 upon every hundred pounds of the native article. Well, that enormous duty was taken off, for the relief of the consumers, and the moderate *revenue* duty of only 20 per cent. was retained. Did the price go down to 37½, prime cost, with 7½ cents duty added, and did the consumers get it for 45 cents per hundred pounds? From 1847 to 1857 the price *rose*, at a pretty even pace, from \$4.31 to \$7.03. The duty reduced to one-fortieth, and the price more than doubled! Who paid the duty of \$3 in 1844, when the domestic production was amply, or, if you please, enormously protected; and who paid the duty of \$1.17 in 1857, when the home product was driven out of our markets?

One more instance, because a much more recent one, must be added:

In 1864 the importation of steel rails began in the United States. They were sold that year to our railroad companies at \$162 to \$135 per ton, in gold. In July, 1867, American manufacturers began to supply the market. The foreign rails went down to \$115 to \$110 per ton. In April, 1870, they were reduced to \$72 in New York.

Now, in 1864, the duty being levied, in effect, in *ad valorem*, was equivalent to \$46.60 in gold, and was paid by the American consumer, which would leave the rail-makers \$101.90 as the prime cost of the rails, or price at New York, duty unpaid. In April, 1870, the duty being an *ad valorem* one, fell on the diminished prime cost to \$18, and left the English producers but \$54 per ton in gold at New York. Here American competition reduced the price in the foreign makers' hands to a trifle over one-half that it had been eight years before.

How do the consumers understand this case? The duty declined \$28.60, indeed, but the prime cost went down more than \$70, and the railroad companies through their chief officers, in great numbers, including the most important of them, petitioned Congress in 1870 to raise the duty upon these rails; and, to make it certainly protective, asked that it be changed to a specific duty and fixed at \$44.80 per gross ton, for which they gave this reason: "As users of steel rails, and transporters of the food and materials for American manufacturers and their numerous employes and skilled laborers, we do not desire to be dependent *exclusively upon the foreign supply.*" They would rather have their rails at \$90 or \$100 than pay, as they did in 1864, \$148 for them. They saw that at an \$18 duty the home competition would be destroyed. They wished to have the price *held down* to the figure at which Americans can make them, and therefore would have the domestic make sustained by a sufficient protective duty. Do they understand their own interests? And are not all consumers in the same position to the question?

Suppose that protective duties *permanently* raise prices above some rate that foreigners can put them at; they yet cannot raise the profits of either the labor or capital employed under them above the level of the standard of prices in all other businesses. Unless the opponents wish to lower such profits to the lowest foreign standard, such an effect is so far from objectionable that the general well-being of the nation is concerned, above all things else, to raise the prices of all domestic products to fairly remunerative rates.

If a nation ought to hold its own interests under its own control, it cannot do so but by defending all its industries against foreign interference. As a people, shall we make it a point of honor and a measure of justice to keep our political self-government inviolable, and at the same time surrender our whole industrial system to the management of whomsoever will administer our economic affairs to their own advantage? Or, if we must have a sentiment mixed with our interests, shall we aid and abet the oppressive system of starvation wages in the countries which can only hold our markets by underselling us in them, and then sending the paupers which their policy makes to us to be cared for? How long would the British system of labor and trade last, if we failed to give it our support? As a matter of common humanity we ought to refuse the products of underpaid labor, just as an honest man is unwilling to be the receiver of stolen goods. These things ought to be considered by the humanitarian and cosmopolitan philosophers of universal free trade.

We suggest them here only to show that a truth of principle and policy is true in every aspect and in every possible application.

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### GLYCERINE.

The familiar opening of juvenile essays never more undoubtedly came into play than in speaking of the substance above, "it is a very useful article!" Indeed, if any unknown process were to be attempted, in ignorance of the proper agents to produce the given effect, we would say, try it with glycerine—what can't be done with glycerine isn't worth showing, if you will allow us a little latitude of language; and this we are free to maintain. Has anyone lately attempted to catalogue its uses? The store-room and nursery alike are indebted for its services; while, in various combinations, manufactures and civil engineering acknowledge it the strong submissive genie who makes light of the hardest labors. What it is, and what it does, is interesting, both to hear and to tell.

Its ignoble origin, born of soap-fat and the meanest lubricating oil, to a true judgment, only renders its subsequent purity and neutrality more valuable. It is the sugar of fat, compendiums briefly tell us; in more definite language, the base of fat, as various alkalis are of marble, saltpetre, etc. It is a fixed neutral fluid, that will mix with water, innocent of all corroding, decomposing, or other injurious properties, and is, in short, the most harmless and enduring of fluids. It is neither greasy nor volatile. It has been kept in open vessels for years without drying up, and this quality adds much to its value. It excludes air, and also prevents fermentation wherever it appears. It unites with water as readily as a sponge sucks it up.

Two processes are known for separating glycerine from the stearic, margaric, and oleic acids which form the other constituents of different fats. It was found that great heat and pressure from steam decomposed fats and oils, and, about 1862, this discovery was acted on in this country. Fat is exposed to water, heat, and pressure in a steam boiler, heated to 370° Fahr., where the water and fat are kept in constant circulation to mix them thoroughly. The glycerine, having a strong affinity for water, unites with it, while the fat, changing its neutral nature, is found floating on the top in the form of an acid. The water is driven off by boiling, and the crude glycerine left behind is purified, by filtration through layers of bone-black, or by distillation. In this state it is equally fit for the hand or the palate. This is the method of procuring glycerine on a large scale. Smaller quantities are made by boiling the fat



with oxide of lead and water. This alkali gives a soap which cannot be dissolved in water, and, as the glycerine is neutral, that is neither an alkali nor an acid, the fatty acid separates from it to combine with the oxide, leaving the glycerine in the water. This is distilled and filtered to obtain the pure article. Glycerine may be obtained from vegetable as well as animal oils, and, to pure fancy, it seems as if that prepared from sunflower or olive-oil would be preferable for using in articles of food. The filtration, however, through bone-dust, and the distillation, must render the glycerine, in any shape, pure as a dew-drop. Care should be taken, however, to secure the article entirely free from traces of the oxide of lead, which is apt to remain after that alkali has been used.

For the purposes to which glycerine is applied, look around you. The mattress of elastic sponge, from which you rose after delightful sleep, or at least sleep under the easiest and most healthful conditions, is made of sponge cut into small cubes and treated with glycerine, so as not to lose its springy properties for years. The hair-dressing most recommended at the present day is a compound of glycerine, which leaves the locks always clean, invigorated, and moist, without the trace of oil to injure hats or clothing, or, still worse, to disgust one with its rancid odor. Three drops in soap lather keeps it from spoiling; and everyone knows how invaluable it is for soothing chaffed or chapped surfaces—for this purpose, however, it must be diluted with an equal quantity of water, or, by absorbing the moisture of the skin, it will produce a parched, burning sensation, the reverse of that desired. In water, its effect is always cooling and pleasant. In fevers, and irritating diseases, like scarlet fever or small-pox, it gives most grateful relief, when mixed with pure soft, or distilled water, and used to bathe the skin. It keeps the surface always moist by protecting the water it holds from drying up in the air. In this case it might be combined with a few drops of carbolic acid with the best effect. Indeed, for medical purposes, gargles, lotions, etc., the acid should always be mixed with six times as much glycerine, which interferes with none of its properties, while rendering it easier of dilution. Even the insects on the vine at your window may be effectually dispersed by a solution of this carbolate of glycerine, without harm to the most delicate plant. The unmentionable pests of the household of the insect race are disposed of by the same application, somewhat stronger than for plants. Fleas, bugs, and ants disappear at its approach. It is true, the active principle in these cases is the carbolic acid, but

without glycerine as its solvent, it would be far more difficult of management than it is now.

The part that glycerine plays in the economy of a household is that of an indispensable and grateful preserver, wherever its benefits are once known. Glue, mucilage and starch are prevented from drying up, or growing unpleasant by standing, when a few drops of the all-sufficient liquid are added. Canned peaches, corn and other preparations of food are kept from fermenting by this agent, without injuring their taste, or harm to those who partake of them. Strawberries, the most delicate of all fruit for keeping, preserve their exquisite aroma when protected by diffused glycerine. Varnishes for wood are not likely to crack when a few drops of glycerine are added before using.

It absorbs the odor of flowers freely, and thus is of use to the perfumer and distiller of flavors. It will keep wines and cider from fermenting, and deliciously preserves the juice of fruits in their first freshness, if added immediately after they are drawn from the press. For this purpose it is esteemed more than the sulphite of soda, which is the widely recommended fruit-preserving powder.

For cements glycerine is much used, as it resists the action of air and chemical agents. Mixed with dry, well-washed litharge it forms a cement which, in from ten to thirty minutes, hardens, and can be used to prevent the leakage of gases. It is proof against water and sustains a heat of over 500 degrees. It is so susceptible of the finest impressions, and so hard when finished that it is used to take casts for electrotyping, as it is readily prepared for the galvanic plate of iron or copper.

A new substitute for India rubber, or rather an artificial rubber, is made from a mixture of gelatine and glycerine. It is elastic, insoluble in oil, mineral or vegetable, and is not affected by hydrogen, qualities distinguishing the true rubber. It renders casks for benzine, petroleum, ether, etc., entirely tight, insulates electric wires, resists coal gas, and makes printers' rollers. The cost is only about 25 cents a pound.

Nitro-glycerine is prepared by mixing in an earthen or glass vessel placed in cold water, fuming nitric acid with twice its weight of the strongest sulphuric acid, the object of which is only to concentrate the nitric acid, and submitting the glycerine to its action. Previously the latter is concentrated by heat, and is then poured slowly into the acid mixture, taking care not to heat it. After standing ten minutes pour the mixture into cold water, well stirred, so as to be already in motion, and the nitro-glycerine sinks to the bottom as a heavy oil, while the water dissolves the superfluous acid. This may be used at once, and

the danger involved in its transportation may be avoided by mixing it as required on the spot where it is to be used, since there is nothing in the process which an intelligent workman is not fully able to take charge of. But if the nitroglycerine is to be kept, all the acid must be carefully washed out, for what remains will cause it to explode spontaneously for some time afterward.

#### WOMEN'S WORK AND MAN'S WISDOM.

Most of the business men of my acquaintance, as well as of yours, too, reader, if you stop to think about it, have taken on their hands to look after the welfare of some woman—young, old, or middle-aged—bound to them by no ties but those of neighborly or human kindness, beside those whose happiness they are legitimately obliged to care for. You don't find a gossipy, tedious old woman, hovering over her cup of tea, who doesn't look to some officer of her church, or some thriving merchant, who has known her family in better days, or for whom her son has worked, to settle her quarrels with the landlord, and get her tax bills receipted, or draw the interest on her bit of bank stock. As for the younger ones, from the public school teacher with fashionable proclivities, who assiduously and insiduously flatters the committee-man or ward politician who she knows will not see her name stricken from the list in any party moves or retrenchments, to the invalid pet of the normal school, a stanch, loving little skeleton, with great eyes and a larger heart, who trusts in the kind, gray-haired principal to see her sweet simple verses through friendly editorial hands, and the five dollars back in her own purse—yes, and the half-masculine dashing portrait painter, an American George Sand, with the license left out, who thanks a coarse, kind-hearted citizen for standing surety for her rent and reputation in the jealously-kept art building, and the consumptive, attenuated press-writer who makes poetical salaams to the burly, joking proprietor who has given her the position which means life and congeniality to her—in every case a man of business talent holds either the place of oak to the ivy, or of bean-pole to the vine, changing the metaphor to suit the case. Nor do the facts warrant the lightest smile at any of the relations here treated of; the most cynical will declare them no more than the spontaneous kindness of the strong to the weak, and the capable to the inefficient. But fact brings up the simile of the bean-pole again. Who has not seen an ash-stick supporting a dozen scarlet runners on cotton threads reaching tent-wise from the ground? Every benevolent person must sometimes feel in the same pre-

dicament, with a host of weaker natures stretching toward him for support. Senator Wilson, of Massachusetts, felt so, a winter ago, when a newspaper scribe unluckily called him the friend of the widow and the fatherless. "Tell that person," said he, "that I'm going to have his life; for, since that article, my steps have been so beset with widows and orphans that I haven't any peace of my own." For their sakes, as well as his own, the good man must wish that those women had a tithe of the business knowledge and force belonging to Mrs. Myra Clark Gaines, or to that feminine contractor who, under his own auspices, cleared her millions on contracts for army clothing. "I wish I knew what could be done with that woman," a man of much practical benevolence said, speaking of a *protegee*. "She can't teach music, she can't get writing to do, and I wish she had sense enough to set up as pastry-cook and earn an honest living." Beside, every man must allow that there is no creature so capable of getting affairs into a hopeless muddle as a woman of ordinary ability and merely ordinary knowledge. A clever woman, with all her boasted intuitions, in her present state of enlightenment, can do more mischief in three days than all her sensible male relatives and two lawyers can undo in as many years. Nobody will admit this sooner than the shrewd of her own sex—*Qui faire?* A man may well ask the question seriously.

Every man who has a daughter to educate owes a duty to her sex through her. He may instill into her a few masculine notions of honor. If she ever goes into business, the habit of promptness in keeping her engagements to visit, to answer letters, and take lessons, will follow her in dealings with the bank, and promises of work made to customers. If she has learned to keep the secrets alike of her enemy and friend at home, her oath as telegraph operator, and her duty as private secretary, will not be hard to observe. A habit of industry and thoroughness in the sewing-room and store-closet will not desert her in the workshop and housekeeper's office. She should be well instructed in the value of all kinds of house goods, for wearing, such as silks and laces, as well as cottons and flannels; for bedding, carpeting, and furnishing. An intelligent customer makes a good saleswoman, or wholesale buyer, when the tables are turned. A few mercantile principles can be instilled without tainting a girl's mind with the flavor of the shop. The ideas that desirability is the condition of popularity, that it is well sometimes to throw away a penny to gain a dollar, and that "nothing is given for nothing," are of use outside the counter as well



as behind it. Every woman who reaches a marriageable age should distinctly understand such laws as relate to her rights and duties, as a wife or single, also the rights of title, leasehold and service. She should be taught the proper form of drawing bank-checks, so as not to present orders "payable in person" at a strange bank, or forget to indorse checks sent by second hand, getting herself into no end of bother, if not of suspicion, by her carelessness. She should know when and how to draw interest on stock without sending some hurried masculine wight a mile out of his way in business hours to do it for her. She should know how by what precautions to make sure the title to real estate, and not invest her earnings on the word of a dishonest seller, an unexamined abstract, or an irresponsible lawyer. A woman found her power of educating her children and caring for her own health crippled by removing from a State which gave her the right to dispose of her own inherited property to another where her husband's consent was necessary to such disposal. Much complaint is made of the injustice of laws, when the trouble is the ignorance of those for whom they were framed.

Every man of business, whose nature does not put it outside woman's strength and interest, should instruct his daughters in its outlines at least. An hour's observation and comment, from time to time, will do this, and, if any special aptitude for the pursuit is shown, he may receive her as an assistant. Merchants do now ask the aid of a wife's or daughter's taste in choosing styles of goods. A large publishing house in New York, whose members belong to one family, invokes the aid of wives and sisters, and relies on their decisions as readers of manuscript. More than one author known favorably to the American public has had his merits weighed by such slender yet unerring fingers. The daughters of professional men not seldom have a knowledge of their fathers' craft which is more than amateur. Nor does this well-digested knowledge lead those who possess it to imagine that because they are competent to decide an ordinary law case, or to edit a newspaper a few weeks, that they are equal to a seat beside Chief-Justice Chase, or capable to control the affairs of government. Above all things, guard a woman from the dangerous habit of measuring herself; she is too apt to take relative for positive value. This habit is aided by the excessive compliment paid to her successes, "which should be translated like that bestowed on talking apes. The wonder is not that the creature does a thing so well, but that she does it at all."

Finally, in summing up the duty a man owes

his daughter, he should teach her to be virtuous and keep accounts, and give her just such capital to start in business as he would feel bound to give his son. Instead of furnishing a house for her, and providing a trousseau on occasion of her marriage, why should he not give her an equal sum to invest in any business that suits her, and earn her own outfit, whether she marries or not? Thousands of women would be saved from loveless, unhappy marriages, or equally unhappy and bitter lives of solitude, by such a provision. To teach her the worth of money, a daughter from childhood should receive her spending-money as a regular allowance, no matter how small, nor should the allowance be exceeded to meet the default of bad management. A few lessons of privation would soon plant the idea of judicious economy in her mind. So much one may do for the girl most under his control. What may he do for others within his reach?

By all means, let a benevolent person economize his help. Instead of frittering away his time and aid trying to reach all who besiege him for assistance, let him select one or more subjects to train thoroughly in his profession or calling, whatever that may be. Nor should he take the first enthusiastic, ignorant young spirit that comes in his way, and waste invaluable energy trying to carve medallions in soft spar, but test and wait, till a piece of true onyx comes into his hand that will endure to the maker's praise. Instead of encouraging the first pretty or "gritty" girl who is tired of the parlor-corner to open law-books and read, or take up an amateur pruning-knife very much to the damage of his vines, or give readings before audiences too polite to yawn, or even to study medicine, let a man deal with such an one precisely as he would with a boy proposing the same path, and not spare the tonic of a cool indifference. While this will discourage those who set out from vanity or restlessness, the true Ulysses spirit will only be stimulated by it. Let that one be assiduously trained, whether she choose to be a Portia or a Doctor Blackwell, or only a careful practitioner in either calling. But let the master be thorough with her, remembering, though not to tell her so, that in training this one girl he is doing more to elevate the sex than by letting loose a horde of crude audacities to practice on society. Though not in favor of the legal profession for women, the writer can see no harm if well-read, well-bred women choose to advise their weaker sisters in the dilemmas where they not seldom find themselves, and the lawyer who educates one modest, serious counselor of the sort leaves a boon to the neighborhood. For medical men I have one sharp word to say, and that is,

they are disgracing their profession, and injuring the sex they propose to help, by dismissing confessedly incompetent women from their classes as graduates. It is notorious that the professors of one of the women's medical colleges in New York declared that the president gave diplomas to a class of eight women only two of whom passed their examinations. "Oh," she said to remonstrance, "we must have some graduates to show, or it will look as if the college was not doing anything!" Those gentlemen would have done the college service by leaving their chairs under a president of such principle, instead of which they yielded the point in silence. I believe that one or two did withdraw, acknowledging thereby the ownership of consciences.

The same thing is good in regard to manual labor. If the gentlemen whose names appear as trustees of the Women's Horticultural Institute on Long Island, who have given liberally of their means and lent all their influence to it, if Mr. Fuller and genial Mr. Quinn would each take a clever woman and teach her how to plant and prune as only they know how, more would in five years be accomplished toward giving women a taste for practical horticulture than Cornell University could do through the far-off agency of an institute. Professor Mapes trained Mr. Quinn to be the successful, enthusiastic horticulturist he is, and the pupil has worked more real good than the master. By the law of increasing influence, that pupil should educate half a dozen others who, in turn, would be fit to teach the science, not spatter it. Academies and institutes, at best, are superficial means of instruction. Personal, undivided attention is necessary to inaugurate a new habit of life and mode of occupation in perfection. And this is really the hardest charity of all, though one which lies within the power of every one to give.

If this should fall under the eye of any rich man sincerely desirous to help women by any ways, direct or indirect, in his power, as one who desires earnestly to see her sex raised from the position where they are aim for the arrows of the cynical, let me beg him to use his influence for the encouragement of manual art and the suppression of the class spirit which is moldering the strength and beauty of the working women's cause. Let him never by word or look pity a woman because, as one of humanity's heirs, she has the common heritage of effort and self-denial. Why, what credit is it to woman's virtue or the quality of her soul that she must be pitied for doing what man esteems it his glory to do, namely, to strive for reward and win it too? Why, if she is honest and industrious, must she be honored

for it as if it were a thing so uncommon in her sex? There is much mischief in the idea of workingmen's associations, and in every enterprise which separates the poor from the rich, and as much in any which sets the interest of one sex over against the other. For this reason, the establishment of any more "working women's colleges" must be deprecated. Better furnish a school, or, still better, a manufactory on the plan of Colonel Hudson's army clothing factory, in England, which, though it employs 1,100 hands, the owner does not inflate even into an "establishment." There is no charity about this plan; work which the government demands at the lowest price is done by well-taught hands under those simple conditions of fair wages and comfortable rooms, to which are added the chance of getting good food at the lowest market price, and of thorough instruction in all branches of the work demanded. Apprentices have to show evidence of skill before they receive pay, "an arrangement which stimulates salutary ambition for excellence," quoting from a report on the subject. Institutions like this, founded for the interest of the owner, but working on enlightened principles, are worth a hundred "colleges" and "school workshops," with the taint of charity breathing in their working and design. That Colonel Hudson finds it pay himself to give \$9.00 a week for eight hours' work when contractors formerly paid only \$2.00 for fifteen hours' labor, is a lesson which will impress the self-interest of manufacturers, to whom one might appeal in the name of benevolence forever in vain.

The lower grades of labor, as they are called, must be made honorable and lucrative. St. Ursula, of Cologne, and her eleven thousand virgins, are nothing to the army of single women in each of the United States who must work or starve—martyrdom being out of fashion. Cooks we want; but these women despise the kitchen. Clothing we want; but they declare they cannot starve at the needle—on fifteen dollars a week. Would that we were sure of finding a trusty seamstress for that price to do the spring sewing. But this thing of supply and demand is working toward a level. Since poor girls in their attics turn to map-coloring and photograph-painting, to say nothing of reading in public and rhyming, not a few of those by birth and position above them are willing to step down and take the places these foolish virgins scorn. I know, to-day, and could name, women of society, whose names are at par on the visiting lists of New York, who would gladly relinquish their idleness for genuine, unromantic work. There is a novelist, whose books will live along with Hawthorne's, who con-



sulted seriously the feasibility of opening a news-stand and sewing-shop, and would have done it if anyone with business insight had been near to advise her in her first inexperience. A city journalist was ready to join her, and prepare the sewing "on improved principles," with the ends of the seams finished off, and buttons warranted to stand washing. The pretty wife of a clever editor in New York does tasteful millinery, *sub rosa*, for her friends, in a style to shame half the professed workers at the business, and would have been glad to assume the open business, but for the reluctance of her husband to see his wife do anything to support herself. He only needed some experienced man of the world to say to him, "My good fellow, let your wife have the chance she wants to occupy her mind with something besides dusting your book-rack and curling her hair. The penny she makes will lighten her economies, and the novelty of her work freshen her spirits. Besides, the example she will set to a dozen girls ready to desert the shop to dabble in aniline inks, and 'report society' in vinegar and honey. Think what she will save us from!" There, too, was the lady in diamonds and thread lace at Stetson's, Long Branch, who confessed, with pride, her labors on the plantation South, braiding palm-leaf hats for the negroes, and showing them how to do it, cutting and sewing their coarse garments, looking directly after the heifers and mules and poultry, the fig crop and the cane, and making more money in three years than her gentlemanly husband did in ten. And there was Emilia, most gracious and peach-like of coquettes, with the useless solitaires sparkling in her ears, who pined for work, and assisted gratis in the sewing for half her friends, while she lamented that her father would not let her enter a workshop in earnest. Such women deserve to be encouraged, and lifted by a firm hand out of their indecision and set to work, before they can realize that they are going outside of fancied social tradition. There were men among the acquaintances of my magnificent Southern woman who were generous enough to give most unwarrantable encouragement to pernicious dabblers in oil-painting, and little sketchy scribblers, and would have started a newspaper for her at once if she chose to edit it; but not one was thoughtful enough to find her a foreman or partner for her lucrative but commonplace plantation. And there were old friends of Emilia's who sent her splendid New Year gifts of mouchoir boxes, and cameos, and took her to expensive fetes and drives and seashore visits, who had been wiser to have given the girl a crisp bank note for every delicate piece of stitching she had done for his wife, and

let her taste the rare luxury of earning her own pleasures, without going outside the circle of her friends. Much is done for the poor working-women; something of refined encouragement is due those workers who are not called poor. Some care is needed to discriminate, but a very safe rule is to reward the best workers, without regard to outside conditions. Do you never think that there must be some stimulus for extra good work beyond the mere impulse of skill? A strong motive binds the best artist to his canvas, other than the mere delight of creation. It is a fallacy to govern the reward for work by the supposed need for it; and injustice is sometimes done in this way which the dispensers would be saddest to know. A young New York woman, of confessed ability in her own line, told me she had been twice set aside from good positions to make room for "some one who needed it more," as the really kind-hearted proprietors would say. These "some ones" were beginners, dependent on their work for indulgences which were not within the scope of their family income. She had a mother and three children depending on her for every comfort they possessed; but she submitted in silence to the decree.

Duty, in the case of help to women, as well as in all others, lies at one's hand. It is not sacrifices, not ingenious social contrivances, that are demanded. It is wise education by the father, just and healthful conditions of labor from the manufacturer, regard to the value of work in itself considered from all employers, and a disposition to exalt the possession of skill into an active and rewarding existence, as well as to honor simple, unconscious industry, and assist its development among women of so-called higher classes, when occasion offers. What goes beyond these limits is not help: it is charity, having less to do with work than with want, and does not belong to the question of what shall be done for the working-women.

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ROCK-BORING.—We learn from a letter in the *Engineer* that the diamond rock-boring machine of Messrs. Beaumont & Appleby recently drove a bore-hole eighty-four feet, in thirty-six consecutive hours, through very hard rock, at a slate quarry in England. A machine capable of accomplishing such a feat ought to prove of immense service both to mining and civil engineering.

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GEO. P. ROWELL & Co., 40 Park Row, New York, advertising agents, is a model business-house. They give more for the money than any other house in the world.—*City Item, Philadelphia*.

## FARMING ON THE PRAIRIES.

BY M. L. DUNLAP ("RURAL").

Boundary of the Northwest not Defined—The Prairie Region—Effect of Settlement on the Climate—The Trade Winds—Culture Hastens Evaporation—Removing of Forests Lessens the Rain-Fall and Dew—Why the Country has Improved in Health—Value of Forest Planting—The Relation that Manufactures and Commerce Have to Agriculture on the Prairie—Our Resources—How Manufacturing has Stimulated the Culture of the Soil—Starved Rock Put to Use—Development of Southern Illinois—Value of the Railways—Our Customers—Selecting a Variety of Crops—A New State of Things.

Where shall we locate "The Northwest?" What States lie to the east of it, what marks its southern line, and where is its western border? Is there land or water to the north, or other countries beyond? Or, rather, is it not too early in the history of "The West" to fix the boundaries of "The Northwest?" For, like the West, its lines may yet be moving, and until these become stationary it might be more politic to say "The Northwest" is "The Northwest," having Chicago for its commercial capital, and thus leave the question of boundary an open one.

We began the Northwest with Ohio, and have added State after State, until the school-boys have become muddled over its geography. By way of compromise, we might speak of the prairie region of the Upper Mississippi, for that covers a sufficient area to talk about in a dozen chapters—in fact, has sufficient material for a dozen books; but just now we will consider what effect

## SETTLEMENT

has had on its soil and climate. In order to do this, we must first take a look at the condition of the country before the plow entered its virgin soil, and pasturage destroyed its rank grasses.

The trade-winds that force the waters of the sea along the Gulf Stream have been turned northward by the Andes, and spread out fan-shaped, and a part of its great volume of tropical air following the Gulf Stream and a part of it passing up the valley of the Mississippi, filling the whole country between the Alleghanies and the Rocky Mountains, pushing its way north through the immense forests that lie between the sea and the prairie region, and in spring driving back the cold of winter, mile by mile, at the average rate of about twelve miles a day, maintaining its position, once gained. Hence it was said by the early settlers that "when spring came it stayed." At the line of the prairie, the heated air was met by the cold currents from the north, and the two, mingling, caused the rainy season of spring; for the cold current precipitated the moisture that the warm air had brought up from the sea. The current of air from the south being constant, it was the stronger of the two; hence the deflection to the northeast giving us a southwest wind.

The tall grasses served to some extent the purpose of a mulch, for it kept the surface cool and prevented evaporation. The sloughs and ponds were filled with rushes and lilies that also retarded evaporation. The result was that the air was saturated with moisture during the day and on clear nights the "dew fell like rain." A slight electrical disturbance cooled a portion of the air, and rain was the result. Under such a condition of things there could be no drought, and vegetation was rank, almost sub-tropical. The streams were full, and as late as 1818 the War Department sent *bateaux* of twenty tons each from St. Louis with supplies to Fort Dearborn. These passed up the Des Plaines and through Mud Lake to Chicago. The Indian chief Robinson, now a resident of Cook county, and who was present at the massacre of the troops at Chicago, has informed the writer that he has often paddled his canoe from Chicago to Fox River, passing from slough to slough over the prairie, meeting now and then a portage of only a few rods. Now Mud Lake, except where the floods from the Des Plaines pour through it, is almost arable land.

## CULTURE PRODUCES EVAPORATION.

It is not so much the quantity of rain that may fall on a given surface that makes it the best for the agriculturalist, but the amount of evaporation. We now see how man, by settling on these prairies and in the country south of here, has worked a marked change in the condition of things—in short, has changed the climate from a damp maritime one to that of a continental climate, with its sudden changes of wet and dry, cold and heat, its long rainy terms, and its destructive drought.

The cutting away of the forest to the south was the beginning of disaster, for this allowed the hot air to push too rapidly over the surface, and also invited the cold air from the north to sweep southward, and now a late spring frost is a common occurrence in that whole region that embraces the cotton States—a thing almost unknown at its first settlement.

The plow and pasturage destroyed the rank grasses of the prairies, and exposed the surface to the evaporating force of the sun; drought followed; the slough became dry, and the decaying vegetation was cleaned out by fire—thus exposing the open surface of these peaty deposits, that had held water like a sponge. The rain was precipitated in torrents, flushing the streams, and spreading disaster along their banks.

But this change in the hygrometric condition of the country had one good effect, for it served to dispel the miasma that produced ague and fevers;



and thus made the country better suited to a dense population.

People are surprised that they can no longer grow immense garden vegetables as at the first settlement, but when they consider the absence of the steady supply of moisture and the equable temperature, they should cease to wonder.

Our climate has now assumed a rather permanent condition, yet subject to sudden changes. But while the ability of the soil has been lessened the general good health has been insured, and the cause of febrile disease been measuredly removed. By the judicious planting of orchards, belts of forest trees, and hedges, we shall gradually improve the climate, for these check the flow of the winds over the surface that rob it of both heat and moisture. The cutting down of forests in all parts of the world has been followed with disaster to the crops; and it is estimated that a country that has one-fifth of its area covered with forests will produce more food than the entire surface without this protection. While New England is descending the scale, as regards agriculture, the prairie country is gradually going up, and the next two or three decades will show even a more decided improvement. We are planting useful forest-trees by the million, and planting them just where they will be of double value—wood and shelter. When every field shall have its shelter belt of useful trees, we shall have attained the maximum of our agricultural capacity, for the products of our forests will be added to that of our fields. We shall save the purchase and freight on this timber, thus giving to manufactures a very important aid.

Every person who has given the subject attention must concede that if we take this prairie country, as a whole, it is the richest in the crude elements of agricultural wealth of any part of the North American continent. And yet the average of its staple crops has fallen short of our anticipations. This may be easily accounted for, in the gradual change that has been going on in the climate, and to the further fact that we have not studied the peculiarities of the geological structure of the soil; in short, we have not fully comprehended the mechanical condition of the various drifts and their adaptation to the several staple crops.

The world has been taught to believe that the great value of the prairie country is its capacity to produce the raw products of agriculture. But their capacity to grow a surplus of useful timber; the immense water-power of the Upper Mississippi, Rock, Fox, and other streams, and the great coal-fields that supply fuel for steam have not been taken into the account, but these combined with cheap food and good health to make

this one of the great manufacturing districts of the world. These advantages are sure to draw to us the products of both field and forest from those points that do not combine all these elements of progress.

In considering the value of the prairie for agriculture, and how we will best manage it, we must take these elements into account, for they will have a vast influence on our rural labors, directing them into new channels and to more remunerative products. If we are to grow farm staples for others to manufacture, or for the purpose of exchanging for manufactured goods, we must select from a small list. Wheat, cheese, beef, and pork can be sent over the water, while corn, oats, butter, wool, beef and pork may go to the seaboard. In both cases we must pay the freight, or, at least, sell less the freight and commission, and pay the freight on the goods returned. We must purchase nearly all of our lumber for farm buildings, fences, and implements; while our irons, nails, and glass come from other States. When we have paid for all these out of the staple crops that we have to ship, very little is left us with which to make more pleasant homes; and this was the case before we commenced developing our coal mines and turning our rivers to use.

Under that state of things Northern Illinois sent to market spring wheat, oats, pork, and beef, as the main staple. While the corn-fields of Central Illinois produced beef and pork, with wheat and corn along the navigable streams, Southern Illinois lay inert, without any incentive to commercial prosperity. But the cheap coal of this wonderful valley, and the cheap iron ore of Superior met in Chicago, and formed the nucleus of an industry that has spread to nearly all parts of the State. This, by bringing consumers to our doors has stimulated the cultivators of the soil, and introduced horticulture, a higher order of rural labor, and we now have a local demand for millions of dollars' worth of the products of the farm, the garden, and the orchard. Then, again, we may purchase all of our implements, and many other articles of need that are made in our midst.

#### STARVED ROCK AND GLASS MAKING.

Starved Rock, a shaft of sandstone, whose base has been washed by the waters of the Illinois from time immemorial, and which attracted the gaze of the voyageur, has now a commercial value, for it is in the center of the great basin of coal, that for ages must have a most decided influence in the history of the West. This sandstone, that nature in her throes forced up through two thousand feet of rock strata, and thus presented it to the hand of man, is the glass-makers'

sand, the saccharoidal sandstone, or St. Peter sandstone of the geologists.

The inertia of Southern Illinois has been broken, for the manufacturer has need of her forests of timber, her beds of kaoline, and her seams of coal. And the new cities and villages of the North that, like pearls on a string, line the iron way, that have grown up by this new home industry, this fashioning the crude elements of wealth into forms of use and beauty, have made a demand for early vegetables, fruits, and other products suited to her sub-tropical climate. Thus has this part of the State been roused into active life, while Central Illinois, from being the home of the husbandman, is teeming with a thousand industries, rural, manufacturing, and commercial.

That the railroads have done much to hasten the development of the country is beyond denial; but the railroads in turn must depend on the judicious management of the resources of the country for their continued success. The railroads have done more than merely open up the prairie country to settlement. They have added a new element in the carrying trade of nations, and divided the land with the water for the highways of the world's trade and travel; and in this latter instance it has brought the world's highway over this prairie region to give to it a new element of progress, the element of commerce, and it is for us to move this trade and this travel across and over this region. This of itself will give employment to thousands of persons who produce nothing from the soil, but who must be fed and clothed, and this adds to the home demand for the products of rural labor.

We also have a European demand for certain staples, just as though we were simply an agricultural people; we have the Atlantic seaboard to be supplied, and, added to this, an immense home demand for the products of the field, the forest, and of the mines to supply the manufacturer and the demands of commerce.

From the Big Muddy River on the south, to the forests of the lakes; from the wood-lands of Indiana to the slopes of the Rocky Mountains, we have many degrees of latitude, and many varying features of soil, in which we grow nearly all the crops of the temperate zone; but all of these are not produced to the same advantage in all parts of this region, nor when produced are they all equally valuable at all points. It is therefore necessary that the farmer should fully understand and know the conditions that surround him, that he may the better select the crops adapted to his farm and to the demands of the market. If he has the capital to invest in a crop of forest trees, such

as larch for fence-posts, railroad-ties, and similar use, of ash for implements and vehicles, or the soft woods for lumber, he should plant accordingly. But there are certain things that should go to make up the net receipts of every farm. First of these is timber for the use of the farm, to be planted in belts, to fill the double purpose of timber and shelter; fruit trees for home consumption if not for market, with milk, butter, beef, pork, poultry, and vegetables. No well regulated farm can dispense with any of these. Fortunately all parts of the prairie region produce all of these in reasonable supply for home use, and while other parts are specially adapted to them; in all such locations these should be largely grown, and more especially where the market also demands them, they should be the leading staples, for the home market as well as for commerce.

Those residing near market will find the heavy and bulky products, such as hay, corn, and potatoes to be the most profitable, for he sells them to the consumer direct from his farm, without the intervention of other transportation, while the more distant farmer would have the disadvantage of freight, commission, cartage, baling, and often extra packages. Under such a state of things, farming becomes a business or trade, requiring as much skill and training as mechanics; in short, a husbandry of such varied resources is so closely allied to mechanics and commerce that it is difficult to separate them in their relations and standing to each other. The shepherd, or the herdsman, was but a clod-hopper, while the cultivator of the prairie must be an educated business man, the equal in points of business tact to any man, of any other industry. He does not so much need broad acres as he needs broad intellect to manage his acres, be they more or less.

Within this range of varied climates and its various products, each farmer may choose that line of crops which best accords to his taste. If the making of cheese and butter please him best he will find the northern part of this district best adapted to this pursuit, for there are the cool springs for his milk and rich pasturage for his cows. If he would make beef and pork, his chief staples, the central portion will give him cheaper corn, cheap hay, and a milder climate, that will, in part, compensate for a richer pasturage. Further south early vegetables, fruits, tobacco, castor beans, hay for the south and timber growing present their inducements.

Farming, to be successful, must therefore be reduced to fixed rules, and adaptable to the conditions that are presented from time to time. If the South will buy our flax-baling cloth, in place of importing jute, we must be ready to respond



If she prefers hoop-iron to rope for her cotton-bales, let our manufacturers supply the demand. If commerce seeks second-growth timber, most assuredly the prairie ought to supply it.

If the prairies have made Chicago the greatest grain market and the greatest lumber market of the world, there is no reason why they cannot make her the great distributing point for many other staples of the temperate zone, as well as the goods from the shops of the artisan. The crude elements of a nation's wealth are ours, and it but needs intelligence, industry and capital to develop them.

The writer is no enthusiast, for he has seen Chicago in her village garb, and the country with its maritime climate, and while the pioneer was struggling for his new home; he has seen the wood mold-board give place to the strap-plow, and that, in turn, to the steel-clipper; he has swung the cradle day by day, ere the advent of the reaper, that now sings its harvest refrain wherever the golden grain flashes back the sun from the prairie billows. It is because the music of fast revolving wheels is heard on the farm, as well as in the workshop, that labor is crowned with a richer reward, and a brighter future given to it for the cultivator of the prairie. That genius shall strengthen the hand of the farmer, and do for him what it has done for other industries, nothing more; for it is this that brings him up to the level of his fellow-men, and makes him a co-worker in the field of progress.

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#### OUR INSURANCE REVIEW.

LIFE ASSOCIATION OF AMERICA, ST. LOUIS, MO.

We have received a pamphlet of sixteen pages, issued at Pittsburgh, taking umbrage at, and criticising, our review of the above company. We are surprised that our article should have caused such a lengthy "refutation," but are glad to see the reply so "eminently indorsed." It is very satisfactory to us to know that a "brother-in-law" has been so thoroughly convinced of our error that he has "called for \$10,000 more." We do not see why the mother-in-law does not also take \$10,000 and become a "trustee," and thus give practical force to the Sixteenth Amendment ere it becomes a part of our Constitution. We are sorry to find that we have aroused the indignation of our doughty critic, but in our innocence we were silly enough to think that we had a right to investigate and to publish any fair criticisms we might think proper to make on any corporation or person coming before the public asking for its money. We have labored for the past twenty years to understand somewhat of the principles and practice of well-deduced life insurance, and desire to give

the benefit of that study to the public free from any pay, fee, or reward, beyond the consciousness of having done our duty. In our view, there is no more excellent or beautiful piece of social machinery than a well-managed life insurance company, and our reviews have pointed out many such; but we regret to state too many existing companies have but very slender apologies to offer the public for taking its money under the guise and name of a sacred trust. We repeat that we admire a well-regulated life insurance company, almost up to enthusiasm, when the *tout ensemble* is in accordance with its rules and laws, which are almost as unerring as the planetary system, and every department is carefully watched and kept in motion. The growth of some eight or ten companies, which have become large, respectable, and responsible, has excited the cupidity of a host of adventurers who, imitating them in some respects, are practicing every craft which their perverted ingenuity can invent to attract and mislead the unwary. When new companies arise and follow the beaten paths of their illustrious predecessors, we rejoice and bid them good-speed; but the schemes and practices of many of the bantlings have been descending lower and lower each year, until the co-operative era has been reached, and we fear soon to hear of gift enterprises and gambling tending to the same end, and still using the honored name of life insurance. In this emergency we have been drawn from our solitude, and have endeavored to convey information to the public by analyzing and popularizing the positions of the various life companies now appealing to the public for support. In doing this we are actuated by "malice toward none." We endeavor to make the official figures explain their own information to the public mind. If the companies do not like the figures their officers have sworn to as correct, it is nothing to us. Upon their own heads must rest the blame. We have so reviewed all the companies doing business in Massachusetts from other States, including the Life Association of America, of St. Louis, Mo. We have no animus against any member or officer of this company; but as we sincerely believe that it was commenced and is carried on contrary to the sound principles of life underwriting, we have taken the liberty of reviewing its proceedings, and pointing out to the public wherein it differs from other well-managed companies, and by so doing we have fallen under the ban of this doughty critic.

We do not feel at all confounded by the terrible shafts hurled at us, and intend to go on and labor in the cause we have espoused as though this thunderbolt were never issued.

We consider the principles of life insurance so universal that our critic can no more shut them out than he can the sunlight. We care not where a company has its inception—whether in Chicago or St. Louis or Pittsburgh—provided that company does its duty and acts its part as a noble and true follower of the principles of life insurance. When our critic sees our May number, he will, we are sorry to state, feel that our eulogies of Chicago companies are not strong. Would we could state they were strong and healthy; but, alas, they are neither strong nor healthy, and the May number will tell the tale!

We do not write on the Association from any pique, but because we strongly feel that it has been concocted and carried out so far on principles entirely foreign to the proper principles of life underwriting. It matters not to us how many excellent gentlemen unacquainted with practical life underwriting may disapprove of our course. We say to such, we have shown the beacon of warning, and ask them to await the result.

We feel, as sure as the laws of gravitation are true, that the future will entirely justify our position. It has been too much the practice with companies, agents, and the public, to see the amount of assets, and take it for granted that all is well, forgetting that "all that glisters is not gold."

We have made it a specialty in the reviews to show each item of the assets, separating the unrealized from the realized, so that the total of each shall be seen and the relation one total bears to the other. We did the same by this company; and we beg to inform our "critic" that we did not throw out the \$400,000 notes, but only showed that the item was notes, and not cash. We ask, where is the injustice in so doing?

We are next accused of having "wakened up the wrong passenger" when we added \$100,000 for capital. We ask the attention of this careful critic to the New York Life Report for 1870, page 147, and he will find that the respected Superintendent of that State added that capital to the liabilities. Is that authority good enough? We do not intend to accuse our doughty friend of reading reports of States, as he proves to the contrary, and we are content. We will now give a little of the "pompous." Here is a little learning on ratios of expenses to receipts: "Any man knows that the percentage would be the same whether it was calculated for a month, or six months, or a whole year!" Oh, how profound! Assuming that the ordinary expenses, as rents, etc., were the same each month, and say that the item for commissions should be \$1,000 one month and \$10,000 the next for salaries and expenses,

does our critic mean to state that the ratio of each month would be the same? How profound! We are further informed that this is a "trick intended to mislead the inattentive reader!"

We are next accused of unfairness in having stricken out the \$400,000 notes—which we repeat we did not—of this company, and of having kept in \$6,000,000 in the review of the Mutual Benefit of New Jersey. Is the gentleman so obtuse as not to see the difference? We will endeavor to remove the scales from his eyes, and show him and the public the difference. We proved to a demonstration that by the time the Association had allowed for lapses and expenses there would be a deficit under our law, and that there was not a cent of surplus to offset these \$400,000 notes, and which, as a consequence, must lay against the reserve as a dead-weight; and if not more successful in the future, the notes must be deducted from the policies at death! Now let us see how the Mutual Benefit stands. It is true it had \$6,000,000 of notes. We believe it has three dividends in abeyance:

|                          |             |
|--------------------------|-------------|
| It has a surplus of..... | \$2,611,273 |
| Dividends debited .....  | 1,887,422   |
| Total .....              | \$4498,695  |

Then there is 'three years' interest at, say, 6 per cent. on this sum, and also three years' interest on the notes, which, together, will yield a sum far greater than the whole \$6,000,000 of notes, and can easily sweep them away. We wonder if our critic can understand the difference now, and would like to know where is the charge of injustice? We fear he has selected an unfortunate example! If he desires further information as to our doctrine on notes, we beg to refer him to our number for December last, page 99, and trust he will profit thereby in his work hereafter.

Exceptions are taken to our comments on the large list of deaths, with only one payment, which appeared in *The Missouri Republican*. We took the information as given to the world therein, and challenge investigation from that paper for the pertinence of our remarks thereon. We are not to be thrown off our course by a flimsy generality. We are further complained of because we copied some extracts from *The Chronicle*, stating how this company obtained Mr. Homan's "eminent indorsement" for the newly "invented margin plan," which was obtained at a cost of \$150; and this our critic put on par with an individual going to a lawyer and getting his professional opinion. He sees no difference between a private opinion and the prominent advertising of this eminent gentlemen's name with the intention of getting money from the public? This shows that some association or other has blunted his fine sense of



honor such as is found in gentlemen of high tone.

We now come to the "final fling," and repeat, "Is this the company, reader, you want? If so, it is open to you." Bear in mind you are paying in your money to-day for your widow and orphans in after years. Are the practices we have been writing on such as you desire your appointed guardians to perform? If so they stand ready to take charge of the position.

We admire monetary science and high-toned solid business principles, where candor and high sense of honor remove every doubt from a member's mind as to his wisdom in the selection of his trustees in such cases.

If the quack-doctor style of advertising and the features of this fraternity are preferable to the solid, high-toned course usually followed by the old and tried companies, the public will, ere long, decide. We do not deny that such practices will flourish for a season—will have that beautiful hectic flush, so charming for a while in a consumptive patient; but the doom is inevitable.

We see the opportunity is seized by our critic to branch off in another direction, and to expound the wonderful new plans and nostrums now used by the Association, and to point out how much better the Association has done in 1870. We will wait till we get the Massachusetts report, and will prefer the figures from there. We are not to be misled by any more sworn statements of 15.90 when the reports make it 30.92. We prefer the official, and the public shall have the result, let it be good or bad, as soon as we reach this company in the forthcoming reports. We will conclude by advising our critic, that next to fighting well himself is to keep weapons from his opponent: his so-called defense has broken his own lines.

We now continue our review of Western life companies not doing business in Massachusetts, and take our figures, as before, from the official reports, as given in the public papers, comparing these returns with previous reports, and commence with one which escaped us.

#### TEUTONIA LIFE, CHICAGO.

This company, being so early in the field with its statement, became mixed with the fire companies and escaped our attention, and did not, therefore, appear with the other Chicago companies. This company commenced business in 1869, and, at the end of 1870, reported assets of \$158,784, which included notes, \$21,683; agents, \$11,724; reinsurance, \$617; deferred premiums, \$23,143, and furniture, \$1,411; total, \$38,478, leaving the better assets at \$120,266. There is a large item for stock notes, said to amount to \$375,000, but, as our laws do not recognize stock notes,

we have omitted them. Such so-called assets are a delusion, and should never appear in a statement. The liabilities, including \$125,000 paid up capital, are \$198,057, showing an impairment of capital of \$39,313. The receipts in 1870 were \$70,627, and expenditure \$51,637, leaving for reserve \$18,990. The reserve for 1870 is \$57,079, leaving a deficit of receipts to meet reserve of \$38,089. The expenses were \$47,637, or a ratio of 67 per cent.

Nothing is said about dividends, and very properly, as there is no fund applicable thereto. Small business, small receipts, and large expenses are the chief characteristics of this company, and we fear that with tight money, coupled with the disposition of the public to avoid the smaller and weaker companies, will make its existence a struggle.

#### ATLAS MUTUAL LIFE, MISSOURI.

This company was incorporated in 1866, and at the end of 1870 reported assets of \$705,727, which included premium loans, \$312,003; unpaid premiums, \$98,801; deferred do., \$50,923; sundries, \$45,416, and furniture, \$3,006; total, \$510,143, leaving solid assets of \$195,582, or less than thirty per cent. of the whole in a tangible realized form. The liabilities, including \$130,500 capital, are \$759,633, being an impairment of capital of \$53,908; but, considering the doubtful character of the assets, we may safely conclude that the impairment will amount to more than fifty per cent. of the capital. The receipts were \$485,670, and the expenditure \$353,598, leaving a balance for reserve of \$132,072. The reserve is \$159,084, leaving a deficiency of receipts to meet reserve of \$27,012.

We find that the notes received amounted to \$130,859, which, added to the expenditure and deducted from the total receipts, will leave \$1,213 as the available balance of cash to invest in securities to meet the reserve of 1870, which reserve is \$159,084. We wonder what class of securities this sum will be invested in! Yes, \$1,213 is the balance of cash left for the protection of policyholders in the reserve given before! This company is of the federal character, and has numerous local boards, which loan all the money received at the local boards. If anything were needed to prove the fallacy of what is termed local boards, and the amount of money secured for improvements in such towns, we have it here! Having fully expressed our views on this subject recently, on another company, we will not now repeat them, since they will still be fresh in the minds of our readers.

The Atlas has indeed a little world to carry—doubtful assets and solid liabilities; capital im-

paired; receipts—such as they are—short to meet the reserve, and a very scanty supply of cash. The expenses were \$212,487, and all, doubtless, composed of cash, being a ratio of 43.96 per cent. With such an *expose* it is useless to talk of dividends; and we will leave the above exposition of the affairs of the Atlas to the calm consideration of the public.

#### COVENANT MUTUAL, ST. LOUIS, MO.

This company was incorporated in 1853, and at the end of 1870 reported assets of \$417,947, which included premium notes, \$116,611; agents, \$3,627, and sundries, \$179,950, leaving the better assets at \$237,997. The liabilities are \$415,909, leaving a balance of assets over liabilities of \$2,038. The receipts were \$187,797, and expenditure \$98,942, leaving a balance for reserve of \$88,855. The reserve is \$97,997, leaving a deficit of \$9,142. The expenses were \$37,004, or about 20 per cent. This company seems to snow much better management than is usual with companies doing the same volume of business, and trust it will continue to improve both in business and economy.

#### MISSOURI MUTUAL LIFE, ST. LOUIS, MO.

This company commenced business in 1867, and at the end of 1870 reported assets of \$294,235, which included notes, \$39,160; in hands of agents, \$35,035, and sundries, \$37,640; total, \$111,835, leaving the cash assets at \$182,400. The liabilities, including \$125,000 capital, are \$315,940, showing an impairment of capital of \$21,705. The receipts for 1870 were \$138,069, and expenditure \$70,359, leaving a balance for reserve of \$67,710. The reserve is \$84,492, leaving a deficit of receipts to meet reserve of \$16,582. The expenses were \$56,356, or a ratio of 41 per cent., which is, of course, more than double what it ought to be for a well-managed company.

We are inclined to notice this expenditure more in this case than usual, since this company offers great inducements in a savings-bank point of view, as they have introduced a plan, on which they profess to return 7 per cent. to their members, and are so—we had almost said—infatuated with it that its officers state that it completes the arch of life insurance. The following is an outline of the plan, and the rates are compared with other companies, so that the public can see the full benefit of

#### THE SEVEN PER CENT. INTEREST RETURN TABLE.

We have been led carefully to examine this table, which, for its advantages, has caused the above company to state in its leaflet, with unusual modesty, that it “completes the arch of life insurance.” The circular states that “novelty in life insurance is desirable only when the scientific principles that underlie its practice are not vio-

lated by its introduction, and when the attractiveness of the new features is coupled with substantial benefits to the insured. The interests of which a life company is the custodian are too sacred to be trifled with.” We heartily concur in the latter clause, and will now see how far this new plan justifies its claims. We have practically examined this table, and at once deny its novelty, since it is akin to that table used by the defunct “Eagle Life of Chicago,” which expired about a year ago. If we take the rate at age forty in this table for \$1,000—viz., \$43.27—and compare it with the life rates of the four principal life companies, this return interest table is more than 27 per cent. higher, which the member must pay to the above company to get this small 7 per cent. returned. The rate of the Mutual Life, New York, is \$31.73 at age forty; Connecticut Mutual, \$31.22; Mutual Benefit, New Jersey, \$30.84; and New England, \$31.50. The rates of the companies named will average \$11.95 per \$1,000 of insurance less than this interest return table of the above company. Now 7 per cent. on \$43.27 is \$3.02; hence \$11.95 is taken from the members, with a year's interest—they boast of 10 per cent.—\$1.19, total \$13.14, out of which this company returns \$3.02 to the members! We beg to give notice that we are prepared to do this kind business on a very large scale, and on receipt of \$13.14 we are prepared to give back \$3.02 for every such an amount!

We ask, why not save this \$13.14 and take the insurance in one of the companies named, where the rates are 27 per cent. less, and where it is certain the companies will return on an average 40 per cent. in dividends, which will save the members 67 per cent. through the whole existence of the policy, when compared with this interest return table!

It is out of character to compare the Missouri Mutual to a well-managed savings bank, as it used in expenses in 1870 41 per cent. of the receipts. We ask, how is it possible for it to make a good investment for members, seeing that \$41 in every \$100 is used in expenses and only \$59 per cent. invested at 7 or 10 per cent.! If the interest return plan “completes the arch of life insurance,” it must have been very near complete before. We think the loud promises of the paragraph taken from the leaflet are not borne out by the merits of the plan, and think but few sensible people will be found to pay \$13.14 for \$3.02. We leave the public to judge of the advantages of this new table, and how much ground it has for asking the public to place its savings in this company, instead of depositing such savings in a well-constituted savings bank. We need not advise



the public. It will know that if \$11.95 must be paid to obtain \$3.02, the business is likely to be small. We here see the effect between theory and practice. The theoretical mathematician was doubtless pleased with the symmetrical proportions of his table, but not so the public, when it would lose 20 per cent. of its investments when compared with life insurance in the companies named.

MOUND CITY LIFE, ST. LOUIS, MO.

This company was incorporated in 1868, and at the end of 1870 reported assets of \$545,472, which included deferred premiums, \$33,530; notes, \$157,408; unpaid premiums, \$113,136; sundries, \$18,465; and furniture, \$5,977; total, \$328,516, leaving the better assets \$216,956.

The liabilities, including \$150,000 capital, are \$562,295, showing an impairment of capital of \$16,823; but it must be borne in mind that 60 per cent. of the assets are in an unrealized state.

The receipts in 1870 were \$429,390, and the expenditure \$219,867, leaving a balance for reserve of \$207,523. The reserve is \$200,267, leaving a balance of receipts of \$7,256. The expenses were \$146,827, or a ratio 34 per cent. There is nothing said about dividends, and but little to apply to any such purpose.

MISSOURI VALLEY, LEAVENWORTH, KANSAS.

This company was incorporated in 1867, and at the end of 1870 reported assets of \$692,397, which included agents' balances, \$5,955; deferred premiums, \$71,182; unpaid premiums, \$62,533; notes, \$281,350; and sundries, \$7,426; total, \$428,446, leaving the better assets at \$263,951. The liabilities, including \$451,000 capital, are \$693,779, showing an impairment of \$1,382. The receipts for 1870 were \$191,961, and expenditure \$77,959, leaving a balance for reserve of \$114,002. The reserve is \$134,080, showing a deficit of receipts to meet reserve of \$20,078. The expenses were \$58,934, showing a ratio 30.70 per cent. Stockholders are to receive one-fifth of the net surplus; but when there is a deficit we suppose it cannot apply. This provision, if put into effect, will be a robbery of the members, since a large portion of any surplus accrues from overpayments. We cannot too strongly deprecate such intended misapplication of funds.

ST. LOUIS MUTUAL, ST. LOUIS, MO.

This company was incorporated in 1857, and as it does not do business in Massachusetts we review it from the statements published in our papers. At the end of 1870 it reported assets of \$5,542,728, which included notes, \$2,059,452; unpaid premiums, \$972,286; and sundries, \$182,955; total, \$3,214,693, and leaving the better assets at \$2,328,035. It is seen that near 60 per cent. of

the assets are of an intangible character. Nearly one million of dollars in unpaid premiums as a net asset!

The liabilities, including \$100,000 capital, are \$5,236,018, leaving an apparent surplus of \$306,710. We say apparent, since with so much unpaid premiums the amount will be considerably reduced on realization. This item equals about four months' premium receipts. The receipts were \$3,176,346, and expenditure \$1,595,823, leaving a balance of receipts for reserve of \$1,580,523; and the reserve is given as \$647,860, which, from the age of the business and its amount, we consider must be an error. The expenses were \$667,973, being a ratio of 21 per cent. Stockholders may receive legal interest of ten per cent.; but from the amount of business done no stock is needed, save for keeping the management in power and the affairs beyond the control or voice of the policy-holders. Dividends are paid on the contribution plan, and apply at the end of the policy year.

## MAKING HORSE-NAILS BY MACHINERY

We hold in our hand a horseshoe-nail made by machinery. Looked upon merely as a piece of ironmongery in common use, it embodies no attractions that would allure the second glance of an ordinary observer; but considered intelligently and fully, it reveals a volume of meaning. Viewed from the proper stand-point, it becomes a symbol of the civilization of our age, and measures the material development of America with unfailing accuracy. It impresses the sagacious beholder with a vivid conception of the high degree of skill in the mechanic arts which must exist among the people capable of such a manufacture, and cogently suggests the multitude of industries which were preparatory, or are auxiliary, to such a production. Had some of these nails been discovered among the buried treasures of Herculaneum or Pompeii, as a veritable and indisputable part of those ancient remains, what a revelation they would have afforded of the local manners and customs, and what a complete change would have been wrought in our estimate of the progress made by that era in utilizing the king of metals.

The earliest trace which history supplies regarding the use of horse-nails, is found in the works of the emperor Leo, of the ninth century, who expressly states that horseshoes were made of iron, and that nails belonged to them. Moreover, this method appears to have been confined altogether to Europe. Evidently the ancients knew nothing of such a device. Xenophon, Vegetius and other authors give certain modes of

rendering the hoof harder; but no clear intimation is anywhere to be discovered that either the Greeks or Romans made a practice of shoeing horses to protect their hoofs from wear. On the contrary, we find many indications that, through ignorance and lack of some such contrivance, military operations were often interrupted, and the cavalry forces temporarily disabled, compelling their retirement from active service until such time as the hoofs could grow again. To this day the Japanese have no better protection for the feet of their horses traveling on stony roads, than straw shoes or socks, which, although replaced at trifling cost, are rapidly worn out. Thus, in whatever direction we turn the eye of investigation, we discern the same urgent need of some appliance to give continued efficiency to the hoofs of animals employed to assist the labors of man—a need realized in the modern horseshoe and nail. In this connection we call to mind that old saw which has been used so often to illustrate and impress the value of giving attention to apparent trifles: "For want of a nail, the shoe was lost; for want of a shoe, the horse was lost; for want of a horse, the rider was lost—all for the want of a horseshoe-nail."

Until a comparatively recent period, almost every kind of nail was produced by hand-labor, each nail, however minute, being separately forged from a thin rod of iron. For a long series of years, forging and drawing nail-rods, composed of the toughest wrought-iron obtainable, for the purpose of making horse-nails, with countersunk heads, so that they would lie flush in the groove prepared for them in the horseshoe, was commonly a part of the blacksmith's business. The end of the nail-rod was first heated in the forge fire, the smith having two or more rods in at the same time, according to his skill. Then the body of the nail was formed on the heated end, and cut off by a chisel fixed in the anvil-block. While still hot, the nail was placed in a bore or heading-tool, which was a piece of strong iron with a steel knob at each end, perforated to the size of the shank of the nail, and countersunk to correspond with the head, and the head was fashioned with the hammer. This process was not only slow, tedious and laborious, but was beset with the disadvantage of an imperfect product. Such hand-made nails almost always lacked the elements of uniformity and finish. They were unlike in length, in thickness, in width, in weight, or in size of head; sometimes in all these respects at once. Occasional ones were too much of a bungle to pass properly through the hole provided in the shoe, and had to be drawn out, with a loss of time and efficiency. In addition to these drawbacks, a skillful black-

smith could produce only about ten pounds of such nails per working day of ten hours; but, as they were seldom, if ever, made in that steady way, being generally the product of desultory intervals, the workman could not acquire that perfection and dispatch in the operation which results from the long-continued practice of one thing. It remained for inventive genius to accomplish the task of combining into a single, simultaneous process the various direct blows and sliding strokes employed in forming a horse-nail, so that the complicated motions of the human hands, in tapering and beveling the body, forging the shank, and shaping the head, should be reproduced by automatic machinery.

The only horse-nail manufactory in the West is that of the Northwestern Horse Nail Co., located at 56 to 68 West Van Buren street, Chicago, established in 1862, incorporated in 1864, and possessed of a working capital of about \$80,000. Officers of this company are N. Corwith, President; G. L. Smalley, Superintendent; A. W. Kingsland, Secretary. Besides being practically acquainted with all the details of their business, they, one and all, are stockholders, each thus having a personal stake in the excellence of their manufactures and in the satisfaction of their customers. Mr. Smalley's post of duty is within the factory itself, where every operation proceeds under his immediate supervision, his being the mind that plans and regulates the mechanical accomplishments of the shop, from day to day. Mr. Kingsland, one of the originators of the enterprise, manages the general business, including the financial department. Bred as an iron manufacturer, and having a natural inclination and aptitude for the calling, he has brought to the position he holds a knowledge and an experience which make him that much more skillful, expert and useful in performing the duties he owes alike to the company and to the public.

From the very inception of the undertaking, one of the principal objects has been the utmost attainable perfection of product. The very best description of material being an indispensable means to that end, the company contracted for a regular supply of "Benzon" iron with certain parties in Norway, who are under heavy bonds to furnish a uniform quality, made from one particular kind of ore, and not to increase the production beyond a specified amount. This supply is imported into Boston in bars an inch and one-eighth square, is there re-rolled into bars three-sixteenths by seven-sixteenths of an inch, and nine feet long, and in that shape is forwarded to Chicago for use. What is technically known as the "Patent Hammering Machine" was adopted to work up the



metal, the manufacture giving employment to some fifty skilled laborers, who have acquired a surprising adroitness and efficiency in handling and feeding in the nail-rods—a consummate excellence of manipulation attainable only by persons who repeat the same operation in uninterrupted series, day after day, as a regular occupation. To secure the highest grade of workmanship, these men are paid for their services, not by the week, but by the pound of standard product—a plan by which the best exertions of the employee are induced, and his superior skill adequately rewarded; for, no limit being fixed to his production within running hours, the more nails he can make that will pass the test of inspection, the larger will be his compensation. In this way, aptitude and proficiency obtain due recognition, while sloth and negligence receive their just deserts, an unreasonable amount of waste or defect being debited as a loss to the offender. Through such comprehensive precautions and checks, accompanying every individual nail from its undeveloped condition in the raw material to its perfected shape and boxing for shipment, sparing no requisite pains nor expense at any step of the progressive movement, the special commodity of this company has won its way to universal confidence, having achieved the enviable reputation of being more uniform in excellence and more desirable in form than any competing article in the market. The brand is so well known and so favorably received, that the agents of Eastern factories, when canvassing for patronage throughout the West, are accustomed to recommend their nail by saying it is as good as the Northwestern. Already the area covered by its sale is immense, extending, on the one hand, from St. Paul to New Orleans, and, on the other, from the Ohio River to the Rocky Mountains. It appears, moreover, that there are fashions in horse-nails as well as in hats and bonnets, and that this manufacture meets the prevailing want of the interior. In some other parts of the Union a different style is in vogue. This particular make is the result of a rather curious generalization. Some years ago the company received from various dealers a number of sample nails, accompanied with the suggestion that such a shape and kind would find ready and extensive sale in certain neighborhoods. A concentration of the several merits of these specimen lots into a single nail, accomplished the desired improvement, and laid the foundation of its present popularity. Six sizes are made, numbered from 5 to 10 inclusive, 8 being the medium size. Spring is the slack season of the trade, during which—and through the summer months, in consequence of the ex-

hausting heat—the factory is run only ten hours per working day; but in the winter the machinery is kept in operation constantly from Monday morning until Saturday night, without intermission. To meet the opening demands of business, it has been found necessary to accumulate in store not less than two hundred tons of nails, boxed and ready for shipment. Last year the aggregate product was six hundred tons; it is estimated that the footings for the current twelve-month will largely exceed those figures. As the nail is sold at New York prices, it adds the saving of freight to its inherent advantages, and is steadily winning its way to a more extended consumption, superseding all other varieties wherever its sterling merits become known and are tested.

We recently having satisfied our curiosity by a thorough tour of observation through the works of the Northwestern Horse Nail Company, our readers may derive from a description a portion of the pleasure we experienced from a personal survey of this interesting industry. We enter, then, the main building—a one-story structure, 60 by 112 feet, with a wing 30 feet square for the motive power—and are ushered into the midst of an incessant hum and rattle, where the ordinary tones of the voice are swallowed up by the din. Before us, on each hand, in two parallel rows, extending the length of the shop, with a broad pass-way between the lines, are twenty-five machines in operation, each depositing in an adjacent receptacle a red-hot nail, almost at the rate of one per second. In front of each machine stands a workman. On his right, within easy reach, is a coke-fed furnace, the blast for which is supplied through connection with a large galvanized iron pipe, just overhead, which runs from one end of the room to the other, and finds its air-force in the fans attached to the engine. Beside this furnace lies a goodly pile of nail-rods for replenishing purposes. Eight of these rods lie thrust in the fire to the extent of about a foot, the thither portions reposing upon a rest. One of these rods the nailer deftly removes with his right hand, and pushes the red-hot end into the mouth of the machine until it is arrested by a steel gauge. Almost simultaneously with this stoppage, a gripe descends upon the rod, pinches it tight, and holds it fast. Meantime the gauge has dropped out of the way, leaving about one inch of the rod resting fairly upon the surface of a small anvil. With instant swiftness, a pair of hammers, operating horizontally from opposite sides, and indented with the shape of the nail widthwise—taper, shank, and head—smite against the recumbent metal, beating it into form with rapid blows, but so arranged that in no event can they approach

each other beyond a fixed distance. While this operation is taking place, a rotary mass of iron (on whose circumference, at each extreme of the diameter, is affixed a small steel roll, turning easily on its axle) is moving at the rate of 1,050 revolutions per minute. These rolls successively strike the end of the nail-rod a sliding blow, in passing over its surface, drawing out the metal without tearing it, very much after the manner of the blacksmith with his hammer, when fashioning the taper of a nail. Within a single second, eighteen blows of the various kinds have been struck upon the red-hot end, in addition to which the point has been pressed laterally away by a contrivance to facilitate the action and efficiency of the cutters, which now sever the completed nail from the rod at one clip, and drop it, yet glowing, through a vertical guide-way into a box underneath. The nailer then advances his rod once more against the gauge, and the whole operation is repeated. This continues until eight to ten nails have been made, when the rod is transferred again to the furnace, and a fresh one substituted in the machine. Including the delays occasioned by these changes, a workman will average fifty nails per minute, or about two hundred pounds per day. When the rods are worked up to within some two feet of their length, they are cast aside to undergo a process which will be described in its proper place. In its workings, the machine is intended to effect, and actually does accomplish, the same sort of operations by automatic mechanisms as are usually performed by the hands of the blacksmith with his hammer and anvil.

The custody and oversight of each five machines is assigned to a separate foreman, whose duty it is to grind the dies, supervise the nailers, and keep everything in order in his department. He carefully notes the progress of the work, keeps the workmen supplied with materials, and sees to the removal of the product to the assorting-room. There the boxes are emptied upon iron-covered tables, and each nail passes under inspection, the imperfect ones being picked out and thrown aside as scrap-iron. An account is kept with each nailer's box, not only so as to credit him with the number of pounds made, but so as to mark and remedy any lack of excellence. The foreman of the room keeps a lookout for all unusual defects. If the nails are too thick or too thin, or in any other respect fall short of the standard, he at once reports the fact to the superintendent, who applies the corrective. So soon as there is a sufficient accumulation of assorted nails, they are packed in 25-lb boxes, 12 inches long, 9 inches wide, 5 inches deep, and are branded for market.

One additional process remains to be noticed.

We have seen that the workmen cast aside the nail-rods so soon as they are reduced to about two feet in length. This is because they cannot be further fed into the machines with advantage. Were there no better way to utilize these waste ends than as scrap iron, a considerable loss would be the result, entering largely into the cost of the manufacture, and appreciating the price at which the finished product would have to be sold. To meet the emergency, a welding-machine of novel construction, and exactly suited to the needs of the case, was invented by one of the employees of the company. It is so devised as to make the welded parts of a uniform size with the original rod—a very important consideration; for each nail contains a fixed quantity of metal, and were portions of the rod bulkier than others, the desired sameness of product would be unattainable. Two of these machines are kept constantly in operation, each requiring the services of one man, with the adjunct of a forge-fire. Thither the waste pieces are brought and welded together, to the extent of four to each rod, and are then returned, to be worked up as before, so that there is no unnecessary loss of material. With the aid of this welding-machinery, two operatives are able to accomplish as much work as would occupy the time of five skilled forgers, operating in the ordinary manner, besides obtaining a completer and more uniform result.

Under the same roof, in a commodious room to itself, is located the machine-shop of the factory, fitted up with appliances adapted to meet surrounding exigencies. There all needed repairs or renovations of parts can receive expeditious attention, at the hands of artisans who have a practical knowledge of the requirements of the occasion. Theirs is a twofold skill; first, as regards machinery in general; second, as relates to the specialty to which they are attached. A further advantage is their constant presence on the premises, affording ready resort to their services at any pressing moment.

The works of the entire establishment are driven by a steam-engine of 75-horse-power, contained in a wing to the main building, thirty feet square, the nail and other machines being operated by shafts driven by belts from the main shaft, and the blast for the attendant furnaces being supplied by a couple of fans, which feed the current through two large galvanized iron pipes, extending at parallel distances the whole length of the shop.

As we leave the whirl and rattle behind us, and pass out into the comparative quiet of the open air, it is with a more exalted estimate of American enterprise and ingenuity in organizing skilled labor, and subordinating the forces of nature and



the mechanical powers to the service of man. What an important part even so trifling a manufacture as a horse-nail plays in the industrial and commercial progress of the country! What a multitude of interests center in this single article, and derive from it a portion of their own prosperity! What widely separated regions and different classes are affiliated with one or another stage of its production! For it, in far-off Norway, miners delve for ore, furnaces illuminate the rugged landscape, forge-hammers scatter their showers of corruscations, and hundreds of laborers exert their muscles and their skill. For it ships plow the ocean wave, bringing the needed freight more than three thousand miles to a Massachusetts port. For it Boston workmen and machinery change the size, shape, length, and style of the raw material. For it railroad lines provide transportation, and from it realize profits. All this, too, before the first blow can be struck upon the first nail. Then come steady employment and means of subsistence afforded to a considerable number of persons by the processes of manufacture, besides the incidental support extended to other industries by the consumption of their products. Next follows the business created by the distribution, sale, and use of the finished article. So we might go on through a long complexity of relations, to trace out the minute but no less positive influences of these little pieces of ironmongery upon the comfort, convenience and welfare of the masses of the people. In the hands of trained and expert rhetoricians, accustomed to draw a rich abundance of ingenious combinations and vivid pictures out of materials placed at their disposal, this theme might be animated and colored into one of deep interest, without resorting to the doubtful aid of exaggeration, or even quitting the plain path of straightforward truth. We can think of few magazine papers that could be made at once more entertaining and instructive, than the imaginary autobiography of a horseshoe-nail, beginning with the ore in its native mine, and ending with the worn-out fragment; for, without departing from the domain of experience and the strictest confines of deductive probability, there are facts, vicissitudes and poetical associations enough to supply all the matter requisite for an artistic treatment of the subject.

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MESSRS. JONES & LAUGHLINS, Pittsburgh, are making preparations to erect thirteen new puddling furnaces, in addition to the large number already in active operation at the American Iron Works. Another addition of similar proportions would bring the number of puddling furnaces up to one hundred.

## ECONOMY IN THE USE OF STEAM IN THE STEAM ENGINE.

BY PROF. W. P. TROWBRIDGE.

A lecture was given recently in the Mechanics Course of Lectures, at the Sheffield Scientific School of Yale College, by Mr. C. E. Emery, engineer, on the results of experiments made by him, under the auspices of the Novelty Iron Works of New York City, to determine the relative economy in the use of steam of different pressures, and different grades of expansion in the non-condensing engine.

A full account of these experiments will probably be soon published, and it is only intended here to give some of the principal facts or truths brought out; especially those which relate to the questions which have for a long time been the subject of controversy, and not unfrequently of excited disputes, among practical engineers, in regard to points of cut-off in ordinary engines, which will be attended with the least expenditure of fuel in accomplishing a given amount of work.

It has long been acknowledged that correct information in regard to the phenomena of the action of steam in the cylinder of the steam-engine, under the varying conditions of practice, must be the only sure basis on which economical practice can be founded; and it may be said in reference to these phenomena, that the deductions of theoretical science have been insufficient to define them on account of their complex nature and the influence of a multitude of secondary causes, which, in the present condition of the science of heat, and the action of bodies under its influence, could not be definitely determined.

The practical experiments which were the subject of discussion by Mr. Emery have probably supplied the most reliable and correct information on this subject that has yet appeared, and the information gained may be safely followed as rules of practice, wherever steam is used as a motive power, under conditions similar to those chosen for the experiments, namely, in all ordinary high-pressure engines in common use.

The experiments were made with an engine constructed for the purpose, of the ordinary high-pressure type; but with arrangements for condensing the steam after it had performed its work, while the power expended was ascertained with great care by means of the indicator. These arrangements were made thorough and effective, so that no question could arise which might throw doubt on the correctness of the results, while as an additional guaranty of their correctness, Mr. Emery had previously been occupied several years in making similar experiments for the government, and brought to the work not only

practical experience in such experiments, but also the theoretical and practical training and knowledge of a thorough steam engineer.

The steam being all condensed in each experiment, and the resulting water weighed by an accurate scale, or balance, gave the number of pounds of steam, or water converted into steam, required for one-horse power per hour, at each pressure and temperature, and degree of expansion named in the following table.

No attempt was made in the experiments to determine the economy of the boiler, which was of the ordinary tubular or locomotive type; but the steam was used as delivered from the boiler at the different pressures, thoroughly dried, but not superheated.

The principal facts which were developed, and which are of most general interest, are given in the following table:

TABLE Showing the Results of Experiments on the Economy of Steam used Expensively in the Non-Condensing Engine.

| PROPORTION<br>OF<br>STROKE<br>CUT-OFF. | PRESSURES OF STEAM IN POUNDS PER<br>SQUARE INCH.    |   |   |   |   |
|--|---|---|---|---|---|
|  | 25 lbs.   | 40 lbs.   | 60 lbs.   | 80 lbs.   | 100 lbs.  |
|  | Water ex-<br>pended per<br>horse power<br>per hour. | Water ex-<br>pended per<br>horse power<br>per hour. | Water ex-<br>pended per<br>horse power<br>per hour. | Water ex-<br>pended per<br>horse power<br>per hour. | Water ex-<br>pended per<br>horse power<br>per hour. |
|  | lbs.  | lbs.  | lbs.  | lbs.  | lbs.  |
| 0.                                     | .....   | .....   | .....   | .....   | .....   |
| .05                                    | .....   | .....   | .....   | 42  | 37  |
| 0.1                                    | .....   | .....   | 44  | { 36½   | { 32  |
| 0.2                                    | .....   | 52  | *39¼  | *34   | *31   |
| 0.3                                    | 70  | *48¼  | 40¾   | 34½   | 31¼   |
| 0.4                                    | *63   | 50  | 42¾   | 35¾   | 32¾   |
| 0.5                                    | 64½   | 52  | 44½   | 37¾   | 34¾   |
| 0.6                                    | 66¾   | 54½   | 46½   | 39¾   | 36¾   |
| 0.7                                    | 69  | 56¾   | 49  | 41¾   | 38¾   |
| 0.8                                    | 71¼   | 58¾   | 51¼   | 44  | 41  |
| 0.9                                    | 73½   | 61  | 53½   | 46½   | 43½   |
| 1.0                                    | 76  | 63¼   | 56  | 48¾   | 45¾   |
| Full Stroke.                           | 76  | 63¼   | 56  | 51  | 48  |

\* Minimum, or point of greatest economy.

The first column shows the points of cut-off in tenths of the stroke of the piston. The second, third, fourth, fifth and sixth columns show the quantities of water in pounds which were converted into steam at the pressures named at the tops of the columns respectively, and for the points of cut-off in the margin.

The second column, under the head of 25 lbs., for instance, shows that cutting off at 3-10 of the stroke the expenditure of water to produce one-horse power for one hour was 70 lbs. Cutting off at 4-10, the expenditure of water was 63 lbs.; at 5-10, the expenditure was 64½ lbs.; and the expenditure increased gradually to full stroke, at

which it was 76 lbs. The minimum expenditure was at 4-10 of the stroke, at which it was 63 lbs.

For a pressure of 40 lbs., the corresponding quantities are given in the third column. In this it will be seen that the minimum is at 3-10 of the stroke, at which the expenditure was 48¼ lbs. of water. At all points, including full stroke, the expenditures at the same points of cut-off are less than in the preceding column.

At 60 lbs. pressure the most economical point of cut-off is still lower, being at 2-10, at which the expenditure is 39½ lbs. of water.

At 80 lbs. pressure the least expenditure is at about 15-100 of the stroke; and at 100 lbs. pressure it is still lower, lying between 1-10 and 15-100.

By a further inspection of the table, it will be seen that it is more economical to use the higher pressures even following full stroke than the lower pressures with the most economical point of cut-off. Thus all the quantities in the last column, which are the results of using steam at 100 lbs. pressure, are less than the least in the third column, where the steam was used at 40 lbs. pressure; and it is to be remembered that each quantity given represents one-horse power of work continued for one hour.

This table exhibits, therefore, the law of the economy not only for various points of cut-off, but for increasing pressures of steam. Taking any one vertical line of figures, the law is given for various points of cut-off, with the same pressure; and taking any one horizontal line, the law is given for the same point of cut-off, but for different pressures.

The absolute cost in dollars and cents for one-horse power per hour, for any one set of conditions given in the table, may be found by taking the quantity of water expended corresponding to those conditions, and assuming that in ordinary boilers one pound of coal will evaporate seven pounds of water. The quantity of coal required per hour for each horse-power may be easily calculated.

If these results be thrown into the form of curves, the horizontal line being divided into equal parts representing tenths of the stroke, and the vertical margin divided into equal parts representing pounds of water, they strike the eye in a more marked manner. The law of increase of economy with increase of pressure is then more clearly brought out; and although it appears that this economy continues when the steam is used at higher pressures than 100 lbs., yet above 100 lbs. the question of durability of the boilers must be taken into the general account, and it may not be advisable to employ steam commonly at press-



ures above 100 lbs. In ordinary cases 80 to 90 lbs. will be sufficient to insure the best results, taking boilers and engines both into the account.

Under all circumstances of expansion, the results show that the most economical point of cut-off lies between 15-100 for 100 lbs. and 4-10 of the stroke for 25 lbs.

The experiments practically settle the questions so long the subject of dispute, and the results given in the table furnish standards which ought to be attained under the most favorable circumstances in practice, and may be used as references by engineers.

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### THE SALT COMPANY'S DEFENSE.

[The following letter was written to the *New York World* by "The Onondaga Salt Company," of Syracuse, N. Y., for the purpose of refuting sundry allegations made by the *World* in the interests of the exemption of the salt importers from taxation, and against the protection of the domestic manufacture.]

*To the Editor of the World:*

SIR: The "great salt monopoly" at Onondaga desires from you, as fair-minded opponents, a hearing in your columns.

And, first, may we ask what is meant when you hold us up to public odium as a monopoly? Salt is produced only at the limited number of places where the Creator has distributed the brine or the mineral in its natural state. If this makes us a monopoly we cannot possibly help it, and ought not to be severely dealt with.

It is true, however, that, like other people, we associate our capital in order to economize production, extend our market, steady prices, carry the salt as near as possible to the consumers, and keep the profit out of the hands of the speculators. If this is "monopoly," then all associate capital, every partnership, and every incorporated company in the land must be characterized in the same manner, and exposed to the same condemnation.

We have often been spoken of by you and others as the recipients of unreasonable and enormous profits in our business. In this respect we have not been fairly treated, as a brief explanation will show.

It would be uncandid in us not to admit that, during two or three years of the war, our profits were very large. In 1862, for example, the commerce of the Mississippi was closed, and a great panic arose in the Western and Southwestern salt markets. The important salt interests of Michigan and Ohio were not then much developed. The Kanawha Salt Works were destroyed by the

enemy. The result was a most extraordinary demand for our Onondaga salt, which carried prices absolutely beyond our control. The moment our salt reached the great markets referred to, the dealers in the article would take it at our existing prices and instantly advance them to higher rates. We were compelled to follow them upward, or give to speculators the profits which belonged to the producers. This is an exact history of that period, and the same causes operated to a modified extent in 1863 and 1864. It was a condition of affairs entirely anomalous.

But there is a further explanation to which we would beg your attention. At the time we are charged with making such large dividends we managed our salt manufactories, fairly valued at some \$4,000,000, with a small cash capital of \$160,000, which was contributed by the owners of the works, and they held the stock to represent it. Now, the very large dividends imputed to us as a crime were calculated upon that insignificant moneyed capital, whereas they were earned by the whole capital of more than four million dollars used in the business. To be precise in this statement, our business employed and required the manufactories not represented in stock and the cash which was so represented, while the profits were estimated and divided upon the latter only. This single statement will give you a very different view from the one you seem to have entertained. Another fact is still more worthy your attention if you wish to do us justice. We had a lease of one of the best coal mines in Pennsylvania, from which we freighted our canals with coal in vast quantities for our fuel. Fuel is the main item of expense in the production of salt. There was a combination among the coal companies, and prices were high. By supplying ourselves, we actually saved, in the years 1863, 1864, and 1865, not less than \$1,000,000, as the difference between the cost to us and the prices charged in the open market by the coal companies.

This was one of the economies of our association which would not have been possible to individual enterprise; and, finally, soon after the close of the war, we sold our coal lease for an actual bonus in cash of \$510,000. Now, all these savings upon coal, as an incidental branch of our business, and all the premium on the sale of our lease went to the credit of our little capital stock in the salt business, and are so imputed to us in all the public statements which have appeared. We beg leave to verify the facts in any way you may suggest.

In this connection, it is proper now to add that, since the war, and for the last few years, the salt business and trade have returned to their normal

condition. The profits have not been immoderate in any year, and, in some years, there have been not only no profits, but actual losses. In the year 1870, our company sustained a loss of nearly \$300,000 in the manufacture and sale of nearly nine million bushels of salt. The truth of these statements we will show to you in any manner you please. We invite you to visit us, or send an intelligent reporter. We will spread out the facts before you, and exhibit our books, which are honestly kept. We wish you to believe that we are not thieves or sharpers, cut-throats or brigands, but very much like other men; certainly no better, and, we trust, not materially worse.

An extraordinary statement in your paper, of the 13th inst., and repeated on the 15th, chiefly demands our attention. You say that 40,000,000 of bushels of salt are annually consumed in this country; that the impost duty is 15 cents a bushel, enhancing the price of the whole to that extent, and that the \$6,000,000 thus added to the total cost goes into the pockets of the "salt monopolists." You thereupon call us pirates, and use other endearing expressions of that nature. Not questioning your sincerity, we ask leave to give you some information, which you certainly seem to need.

And, first, you have overstated the quantity of salt consumed by 5,000,000 bushels, and you have overstated the duty by more than one-third. The duty on foreign salt is 18 cents per 100 pounds, the addition of 6 cents for salt in sacks being the duty on the sack, and not on the salt. Now, as 56 pounds make a bushel, the duty is very little over 9 cents. These are details of no great importance, but it is well enough to be accurate.

Your statement is erroneous, not merely in these details, but is wholly and altogether wrong. A few facts will tell the story. Our company produces nearly 900,000 bushels per annum, and, upon your own theory, that 15 cents per bushel goes into our pockets in consequence of the tariff, we ought to pocket the comfortable sum of \$1,350,000 per annum, instead of which, we pocketed, last year, a loss of \$294,395.87. Have the goodness to look at the following statistics: In the year 1870, the average prime cost of a bushel of loose salt at our works was 23½ cents; this includes the State duty, taxes, and incidental expenses, and a fixed rent upon our leased manufactories, but does not include interest or dividends upon our moneyed capital stock, which is now \$1,250,000. Your calculation adds 15 cents more, as the result of the import duty, which ought to carry the cost to the consumer to 38½ cents per bushel, at the works, with all the expenses of transportation, &c., added. That is the

price for which we must have sold in order to pocket the 15 cents per bushel. But our sales, in all our markets, netted us here only 20 cents, which is 3½ cents below actual cost. We presume this statement is quite intelligible to you. If you doubt its accuracy, again we solicit your presence amongst us, and courteously invite you to an examination.

You are very excusably ignorant of the main points of this subject. It is not to be expected that you should be well informed as to the salt business and trade, and it appears that you have been open to extraordinary misinformation. We know that we are trespassing on your space, but yet we desire to post you up as to a few general facts. In competition with the Ohio and Michigan and Kanawha salt interests, we supply more than twelve millions of people between the Ohio River and the Lakes, and beyond the Mississippi. Those interests have mainly grown up under the protection of the existing tariff. Their competition with each other, with us, and with foreign salt at St. Louis, has kept the prices down to figures sometimes yielding and sometimes not yielding a profit. We now send two or three millions of bushels per annum to the city of New York and the tide-waters, and sell there and along the sea-board East and South. We stubbornly maintain our ground there against foreign salt, but the competition is costly and usually brings us loss instead of profit. In the interior of New York and in Northern Pennsylvania we have what we call our home market, but the higher we put our prices the more closely other salts press upon us. Such is our situation precisely, and a true knowledge of it is essential to all intelligent discussion. In a business thus situated and carried on under such conditions it is vain for us ever to expect, and we do not expect, anything beyond very moderate profits, unless anomalous circumstances should again arise out of a foreign or domestic war. If you will guarantee to us seven per cent., which is the legal rate of interest in the State of New York on the capital invested in our production and trade, you may do what you please with the tariff. We will surrender up for twenty years all our salt manufactories with all our rights and privileges to you or any other parties who will give us a responsible guarantee of that nature.

A few words with you about the tariff on salt. If free trade in all other things were established as a policy, we would try to live under it; general low prices would be the consequence and the cost of producing salt would be very much reduced, and of course we could afford to sell at cheaper rates. But until the other interests of



the country are subjected to such a policy, where is the justice, the equity, or the statesmanship of this perpetual raid upon salt as a single interest? We are not Protectionists or Free Traders—we are neither high nor low tariff men; but we say this: while protection is the policy of the country, the salt interest has as much claim to it as any other. We suppose that in due time there will be a general revision of the tariff, and we will take our chances upon such showing as we can make. We do not doubt that Congress will look into the subject and do us justice. Until then can you not be persuaded to let us alone?

You have misrepresented us (unintentionally, of course) and called us thieves and pirates until one branch of Congress, apparently moved by sudden passion, has voted, without examination or a moment's debate, to repeal the duty on salt. Suppose your arguments, or your denunciations, prevail altogether, and the measure becomes the law of the land; what then? You will have struck down one of the great industrial interests of the country, which, with other connected pursuits, gives healthy employment to a vast amount of capital and labor. But will the country have cheaper salt? We press the question home upon you, and pray you to look it in the face?

You yourselves prove, as you think, that foreign salt can be furnished cheaper than domestic except for the tariff, and your conclusion is, let us have no tariff and use the foreign article. This is the upshot of all you have had to say, save and except those gentle and tender epithets which you shower upon us. We can tell you just how far you are right. It is capable of mathematical demonstration that without protection domestic salt must retire from the seaboard, the tide-waters, and the large navigable rivers of the country. It is a reasonable calculation that home production would be reduced from 20,000,000 of bushels to less than one-half and probably less than one-third of that amount. A fatal paralysis would immediately fall upon this great branch of industry. All this you succeed in proving, and you seem to take great pleasure in the demonstration. Incidentally you laud the foreign product, and depreciate that of your own country.

But when our salt, the quality of which in its various grades and kinds will challenge comparison with any other in the world, shall have been driven from its markets, what then? Will you have cheaper salt? That is the question. As to this question, there is a common sense, there is a law of business and trade, worth more than all your theories. Given a keen and sharp competition between two interests in the same market, and the public receives the benefit. Withdraw or

expel one of the competitors, and where is the security against immoderate prices and profits? Do you suppose that the importers of foreign salt are men of angelic natures? Do you in your simplicity understand that they will not take all the advantages of the situation when they are the lords of the market?

Experience and fact are the great teachers. Before the present tariff we were wholly excluded from the seaboard and the tide-waters. We now place there annually millions of bushels, and we beg your attention to the fact that we constantly offer our salt in the city of New York at lower rates than the prices of foreign salt of the same grades and kinds before the enactment of the tariff law. You know that we are still to some extent in a period of general inflation. The cost and price of all manufactured articles are higher than before the war. But we will sell you in the city of New York more than 2,000,000 of bushels during the current year at rates absolutely less than that which the importers charged when they had the whole market to themselves. And what we are saying of the seaboard market is equally true in the great markets of the West approached by the Mississippi and the lakes. We invite you to examine the facts at your leisure.

Many other things occur to us which might be said, but we have no claims upon your further attention, and we close with a proposition for a settlement of our controversy which we hope you will think reasonable and fair.

Our government needs and must have a large revenue. We will therefore diligently inquire and ascertain what tariff upon foreign salt will yield the most revenue, and content ourselves with the incidental protection to our interest which that will afford. If you are agreed to this we will turn our mutual attention to this inquiry, close the controversy at that point, and from thenceforth we will be friends, and neither of us shall any more call the other a thief or a robber.

THE SALT COMPANY OF ONONDAGA.

SYRACUSE, March 18, 1871.  
Attest: J. W. BARKER, *Secretary*.

NEW JERSEY nail mills are manufacturing a new patent nail, for which they have secured a State right. It has serrated edge, and its superiority is said to be manifest in work where any jolting motion may have a tendency to shake the nail loose.

THE Rockford (Ill.) Central Railroad Co. will construct their line from Beloit or Rockton to Mendota, providing the towns along the line will raise \$250,000. They will complete the distance by January 1, 1872.

## STORM SIGNALS.

BY E. COLBERT.

Within a very short time past, meteorology has been lifted out of the domain of uncertainty, and now takes rank among the exact sciences. It is the most recent addition to that select and illustrious circle, though it has stood knocking at the door for admission through an untold lapse of ages; and though often refused, has returned, again and again, with fresh testimonials of fitness for the desired recognition.

It is exceedingly interesting to glance back at the history of these successive failures, which are as old as the history of the human race. If Adam did not look out for weather portents in the Garden of Eden, he certainly could not long after his expulsion have resisted the curiosity to know when the fig-leaf covering must be replaced by the skin of a beast, to enable him to brave the howling storm. But the Georgics, which doubtless furnish us with about all that had been gathered on the subject down to the time when Virgil wrote, present us with the earliest known system of weather forecasts. And these were scarcely improved upon by all the labored efforts of the *savans* who lived after him, till we reach far down into the history of the present century. Yet those celebrated rules were really nothing more than a set of arbitrary aphorisms, which would only hold good for certain localities, and not always for them. It is, however, due to the unconscious adherents of the natural system, expounded by Virgil, to say that their prognostications were, till very recently, of far greater value than all the predictions based on so-called scientific observations, though made by men who brought all the book-wisdom of the ages to their aid. The unlettered sailor would guess right, where the philosopher only made a miserable failure.

Mortifying as was this fact, it was yet so palpable, that very many, otherwise philosophical men, came to the conclusion that the movements of atmospheric currents were an exception to the general order of nature—that every effect is produced by a traceable cause. Not a few spent years of hard study in the attempt to find a clue to the tangled skein of meteorological facts, only to become convinced that the subject was a mere will-o'-the-wisp, and gave up the investigation in disgust. Yet many toiled courageously on, patiently noting the facts, whose accumulation only seemed to increase the hopelessness of the attempt to marshal them in order, and wrest from nature the solution of this most intricate problem.

The thermometer, barometer, pluviometer, hygrometer, anemometer, and all the other metrical arrangements invented to gauge and record the

variations in local atmospheric conditions, are the tools with which the solution has been wrought out; the true secret having at last been discovered that men did not know how to use these instruments half so well as how to invent high-sounding names for them. Yet the observations made with these instruments were of great value. They have enabled us to find out the average temperature and pressure of the air in many thousands of localities, the mean direction and force of the winds, the average rainfall, etc., with the general range of departure from those averages. These observations also show the character of the winds blowing from the different points of the compass; and, when combined with mortuary statistics, they also give valuable information in regard to the influences exerted by the winds on health and disease.

The great step recently taken in our knowledge of meteorology is, however, rather one of degree than of kind. Dr. Edmund Halley, the man who first discovered the periodicity of a comet, is also entitled to the seldom accorded credit of having done even a greater thing in the cause of science, in announcing to the world the existence of a system of trade-winds and counter trades, as due to the operations of law; establishing the theory of atmospheric tides, as the great counterpart to the tides of ocean. The recent discovery is simply that the disturbances in the atmosphere, called storms, have equally definite and measurable rates and directions of movement with the normal or more general phenomena of change that belong to the trade-wind system. This latter truth has been discovered by the careful and systematic comparison of the meteorological conditions obtaining, at nearly the same times, over extensive areas of land and water surface.

It is not difficult to understand the relations of the two great oceans of air and water to each other, to follow mentally their ceaseless interchanges, and to see how variations in the rapidity or location of such interchange, produced by the operation of external causes, give rise to the phenomena generally referred to as the weather.

If the earth had no movement of rotation on her axis, and were unattended by a moon, these two oceans would be in a state of comparative rest. It is the continual change of position, that presents different portions of the surface, in rapid succession, to the disturbing actions of the sun and moon, which gives rise to incessant derangements of equilibrium in the oceans of water and air; and the force of attraction of gravitation is ever at work to restore the balance. The attraction of the moon causes a general translatory movement of the waters of the ocean from east



to west. A wave, of about four feet in height in the open ocean, follows her in her apparent daily passage round the earth, the crest of which changes back and forth across the equator twice each month, as the moon varies her declination. This tidal wave meets with continents and islands, which deflect it from its normal course, and produce a tidal wave of several yards high in places where the current is forced through narrow passages leading from a funnel-shaped bay. The height of the tide also varies greatly, as the sun's attractive force acts with, or in a contrary direction to, that of the moon, the sum of these average forces (moon 5, sun 2) being to their difference as 7 to 3; while the variations in the actual distances of the luminaries sometimes make the proportion as 10 to 3. The tidal movement is due to the attraction of gravitation. But the force of solar evaporation is also a powerful disturber. The average annual rainfall all over the earth's surface is estimated to be not much less than 60 inches. This enormous quantity of water must be previously evaporated, principally from the ocean, and chiefly from that part of the ocean lying within 30 degrees of the equator, north and south. The average daily evaporation in the tropical oceans cannot, therefore, be less than half an inch per day, and is nearly one inch in those parts to which the sun is vertical. A general movement of water from the poles to the tropics is necessary to keep up the equilibrium, and this movement, like the tidal wave, is subject to deflection by the interposition of land masses; while both are affected by the constant rotation of the earth on her axis, which, combined with the initial velocities of the currents, causes those from the equator to tend toward the east, and those from the poles to tend westward. The tidal wave gathers in the tropical Atlantic, flows west till it meets the eastern shores of South America, is shelved off to the northwest by the trend of that coast into the Gulf of Mexico, whence it is reflected out through the straits of Florida, and sent in a northeasterly course down the Atlantic, carrying with it an almost tropical warmth, which causes the winter temperature of the British isles and the Norwegian coast to average 30 degrees higher than the heat due to the latitude of that part of the world. Off the coast of Newfoundland this Gulf Stream meets with a current coming up from the poles to supply the tropical loss, and carrying with it an arctic temperature, which makes Labrador almost uninhabitable though in the same latitude as Scotland. The meeting of these two currents, of different temperatures, gives rise to the fogs on what are called the "banks" of Newfoundland. These currents have their counter-

parts in other oceans, and the location of each is continually shifting, and its volume changing, with the position and varying combination of the forces which produce these wonderful phenomena.

The greater intensity of the solar ray in the tropical regions not only changes an inch of water into vapor daily, but also rarefies the air. The point of greatest rarefaction is evidently a little behind the sun (as in the case of the tides following the moon), and makes the circuit of the globe, from east to west, once every twenty-four hours, while it travels back and forth across the equator each year with the changing declination of the sun. The air, thus heated, ascends, as hot air will go up a chimney, and the cooler air rushes in from the north and south to take its place, to be in its turn heated and carried up, and followed by other air coming from the direction of the poles. Suppose a body of air, moving from the latitude of 30 degrees to fill a partial vacuum thus created in the latitude of 15 degrees. The earth's rotation has communicated to it a velocity of nearly 900 miles per hour, while the velocity of rotation in the latitude of 15 degrees is 1,000 miles per hour. If this air should move toward the equator with its original eastward velocity, it would be left behind fully 100 miles on arriving at 15 degrees, and would thus have a relative westerly motion. The greater heat produces a constant current of air toward the place of the sun, from each pole, and the earth's rotation causes these currents of air, which are called the "Trade-winds," to have also an apparent westerly movement. In the southern hemisphere they blow from the south-east, and in the northern hemisphere from the northeast. Near the line of meeting these winds have become heated and pass upwards, producing the calm so often met with near the equator. Arriving in the upper regions of the atmosphere they become cooled, and flow over laterally, descending to the surface near the latitudes of 32 degrees north and 25 degrees south, and causing a pressure there which, as indicated by the barometer, is fully one-quarter of an inch greater than at the equator. These are the regions of the most violent storms; the hurricane and cyclone rage there. These are also the positions of the greatest storms on the sun's surface—produced by parallel causes, and shown by the sun spots, which are always most numerous in those latitudes, reckoned from the sun's equator.

The average central line of the trade-wind system lies a little north of the earth's equator, as indicated by the positions of these boundary lines of greatest barometric pressure, because there is much more land-surface in the northern hemisphere than in the southern. The air above a

mass of land is always heated much more than that lying over a water-surface, when both are exposed to the same sun-force. Land is heated more rapidly than water, and cools sooner. Here we have the cause of the breeze from the land toward the sea at night, and the contrary during the day, so often met with on the sea-coast, especially in tropical countries.

We see, then, that for a distance of about thirty degrees on each side of the equator, which includes one-half of the earth's spherical surface, we have a system of trade-winds as a direct result of the operation of two forces: the expansion of the central part of the great air-belt, by the heating force of the solar ray, and the force of attraction of gravitation, which is perpetually acting on air, as on water, to make it *find its level*. The barometer shows that the air is a quarter of an inch heavier in the latitude of 32 degrees north than at the equator, and the air always flows from the region where it is most abundant to the one where it is less so, to restore the equilibrium.

Let us now confine our attention to the north temperate zone—remembering, however, that it has an almost exact counterpart in the southern hemisphere. We find that the average height of the barometer in the latitude of 32 degrees is nearly six-tenths of an inch higher than in the latitude of 64 degrees. Consequently there is a constant tendency of the air to spread or blow from the south, all over the vast area included between these two parallels of latitude. But the velocity of rotation on the axis carries the air on the latitude of 32 degrees eastward at the rate of about 880 miles per hour, while the velocity is but 455 miles per hour in the latitude of 64 degrees. The difference of 425 miles per hour represents the velocity with which a mass of air moving northward would seem to *travel toward the east*, if it retained its original eastern impetus. Of course it does not retain the whole of this eastward force, losing continually by friction against the earth's surface, or other masses of air, as it progresses northward. In this latitude the eastward movement seldom, or never, exceeds 40 miles per hour, or 1,000 miles per day.

Here, then, is the reason why our prevailing winds—all those of large volume—come from the west and southwest. The great origin of the air masses which pass over our temperate zone is in the northern boundary of the trade-wind system. Let us now remember that these moving masses of air partake largely of the character of the surface over which they come. Wind blowing over water licks up the vaporizing particles at its surface, and comes to us loaded with moisture; pass-

ing over extensive tracts of dry land, especially if cold by reason of altitude, it has parted with its moisture, and is comparatively dry; blowing over a heated surface it becomes hot and parching; blowing over a cold country it parts with a portion of its heat, and becomes chilly; passing over a marshy country it licks up the miasmatic exhalations, and becomes poisonous. And as the character varies, so its direction and force are changed by the conditions met with. The capacity of air for sustaining vapor varies rapidly with its temperature; a hot clear atmosphere may contain twice as much cloud-making vapor as a cold air that actually feels damp. And as the vapor of water only weighs about two-thirds as much as air at the same temperature and pressure, it is easy to understand how a sudden lowering of temperature, from any cause, may produce a large precipitation of moisture from an atmosphere almost cloudless, and bring about a derangement in the pressure of the air that can only be recovered from by the violent blowing which meteorologists call a storm, whether accompanied by rain or not.

These considerations enable us to see why it is that the greatest abundance of rain falls near the sea-coast, and on the shores of lakes. It is because the temperatures of the air masses above land and water are scarcely ever the same; hence there is always more or less of air movement to recover the equilibrium. When the differences of temperature are great, the motion is so rapid that large quantities of air are forced upwards, and the contained vapor is condensed by the greater cold met with in the upper regions of the atmosphere; the heat being nearly 10 degrees less at the elevation of one-third of a mile than at the surface. If the movement of the air masses be gentle, clouds may be formed, but the vapor will not be condensed sufficiently to form rain. Hence the heaviest rains are generally accompanied by the most violent storms of wind; though, as the column of air is forced upwards in a sloping direction, the greatest force of the wind may not be experienced at the point of heaviest rainfall. For the same reason large quantities of rain always fall on the sides of mountains turned toward the ocean. The sea breeze, laden with vapor, is forced up the mountain side, where it is suddenly cooled by an augmentation of altitude; and copious rains ensue. Being thus robbed of its vapor it has none to deposit on arriving at the other side of the mountain. This is the reason why so many valleys and extended plains are arid deserts. The moisture is taken out of the winds by intercepting mountain tops. The Sierra Nevadas and the Rocky Mountains suck the moisture out of the



air that blows over the continent from the Pacific Ocean, and cause immense tracts of country to be almost entirely without rain. The Great Desert of Gobi is, in like manner, rendered rainless by the Himalaya Mountains; though immense quantities of rain fall on their southwestern slope, scarcely a drop is ever precipitated on the arid tract behind them.

The causes of atmospheric change—WEATHER—are, therefore, of two kinds: general and local. In an inquiry with respect to any particular place, the first of these classes is divided into two, the latter of which is partially local in its character. We have, first, to look for the force and direction of the general air-currents, known by reference to latitude and longitude; secondly, for the character of these currents, as determined by interposition of ocean, low land masses, or mountains; and, thirdly, for peculiarities incident to the location and its immediate surroundings. We find that within the trade-wind region all three of these causes may be so successfully grappled with that the state of the weather at any time may be known beforehand with a considerable approximation to exactitude. As we recede from these limits toward the arctic regions, the operation of the second class of causes becomes less easily traceable, while with regard to the third we can seldom do much better than to guess, as yet, in reference to prospective changes. But the magnitude of the atmospheric variations produced by these local causes is small as compared with those of more general origin. Hence, although we can scarcely expect to be able to look forward to every little wind-gust, or rain-sprinkling that may come from a passing cloud, we can know with almost absolute certainty of the approach of great changes in our atmospheric conditions; and can apply that knowledge to valuable use, by avoiding the destruction of life and property which is so often the consequence of a storm, especially on our chain of inland lakes. Very few of the air-currents that strike the lakes come from or beyond California, as descending currents are scarcely ever known in these latitudes, and winds which have passed over the Rocky Mountains probably never descend to the level of our highest clouds. We never have winds from the Pacific north of California, because the barometric pressure carries them far to the northward of us. Those winds which come from or across Mexico and Texas are dry winds, losing their superabundant moisture in the transit across a large extent of dry land. Hence they are generally steady winds, and non-productive of storms. The air masses which most concern us come from the Gulf of Mexico, and their actual northward motion varies from south-

west to due west, as their greater or less northern velocity combines with the comparative transitory movement due to the earth's rotation on her axis. These clouds probably bring a little less than half our rain (I estimate it at forty per cent.), the remainder being supplied by evaporation from the lake and from the land on which rain has previously fallen. And this aerial "gulf stream" brings fully ninety per cent. of the real storms that visit this region, though the lake supplies no inconsiderable proportion of the rain, and often sends us great waves of cold, in winter and spring, from the ice in the northern portions of Lake Michigan, and from the regions of Lake Superior. And inasmuch as the storm travels only at the rate of about forty miles per hour, while the passage of the electric signal is practically instantaneous, it is evident that if we have a few observing-stations to the westward of us, in the normal track of the storm-wave, and telegraphic connection with those points, we can gain at least twelve hours' notice of the approach of a storm from a distance of five hundred miles, and shall have ample time to guard our shipping against its violence, by recording the fact in port, and notifying those on the lake by means of signals placed at suitable points on the shore.

It is evident that the arrival of a storm coming in any other direction can be anticipated from our knowledge of meteorological movements. We have only to remember that the atmosphere, like the ocean, is perpetually seeking to restore a disturbed equilibrium, and that the barometer shows the weight of the superincumbent air at any place, to see that the air will always move from a region of greater to one of less pressure, and that the force of the movement of the wind must be in exact proportion to the amount of the difference of pressures at any two places. In practice we can only make comparison of barometric pressures, after having corrected the reading of the index for height above the sea level. Thus St. Louis, being 481 feet above the sea level, is 110 feet below Chicago, and the mercury should stand about 0.12 inch higher at St. Louis than at Chicago, when the atmospheric pressures at the two places are actually equal.

Admiral Fitzroy, of England, was the first to give practical expression to the wish to trace the course of storms in advance of their arrival at any particular place. In February, 1861, he set in motion the machinery which has since been adopted almost all over Europe, and was introduced into the United States last year, a series of stations being established by the War Department, under the charge of Gen. Albert J. Myer, Chief of the United States Signal Corps, at which

observations have been taken daily since November 1, 1870. The great value of the system has already been fully demonstrated in Europe, though, as the most important ports are situated on the western coasts, the same opportunity for forewarning is not presented as on the American continent. Yet it is estimated that many hundreds of lives, and millions of pounds sterling, have been saved from the devouring waters by the European signals. The system has scarcely been in use long enough in the United States to have provided us with many tests of its value in this pecuniary sense, the winter season having occupied a large share of the seven months since its establishment. But it is impossible for any one to read the forecasts telegraphed daily from the central office in Washington, and published in the daily papers of this city, without being convinced that they are almost invariably verified, and that the experience of a few more months will enable the comparer to predict with certainty all the major atmospheric disturbances of this section, long enough in advance to make the knowledge of incalculable service to those risking their lives or property on the lakes. It is not to be expected that lake disasters can be avoided altogether, because a great many arise from carelessness, and others from accidents with which the winds and waves have little to do as causes; while still other catastrophes will occur which the warning will come too late to prevent. If, however, the modest claim be admitted that the system of storm signals will save this year half a million dollars' worth of property, and a dozen lives, the saving knowledge will be cheaply obtained, as the information is gathered at very little cost, by men (soldiers) already in the service of the United States, telegraphed at small expense, and published by the newspapers without charge. But it is not improbable that it will effect a saving of five times that amount on the occurrence of one such storm as we have witnessed and suffered from many times in past years.

And the attainment of so desirable a result will bear other fruit. Once let it be known that these storm warnings have been the actual means of preventing large losses, and insurance men will be satisfied that, with such a system of signals in use, they can afford to reduce their premiums on marine risks without sacrificing the principles of sound underwriting. This alone will save a large annual outlay, and benefit the farmer ultimately, by lessening the cost of transporting his produce to the consumer. And there is no reason why the knowledge thus obtainable may not be made extremely useful to the tiller of the soil in a direct way, by enabling him to so order the operations

of the farm as that he can avoid the serious losses so often suffered from storms. The same remark is applicable, in a lesser degree, to all those engaged in outdoor operations in the city, especially in building, as unfinished structures might be braced up, or closed in, to meet the storm which would otherwise entail serious loss.

Indeed, it is almost impossible to point out the immense advantages that will result to humanity when these weather forecasts are perfected into a reliable system. Meteorology, which has hitherto been regarded as a weather-vane sort of pursuit, so impracticable that its students were often looked upon as little better than monomaniacs, will be at once welcomed as one of the most valuable of all our long list of knowledges, as appealing directly and successfully to the pocket test, which is, after all, the most generally accepted standard of worth.

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#### THE PEOPLE'S PICTORIAL TAXPAYER.

The New York Free Trade League are circulating gratuitously and extensively, through the American News Company, a sheet entitled the People's Pictorial Taxpayer, purporting to illustrate, by various cartoons and pictures, the baleful effects of levying a tax on such foreign products as compete with our own. Its arguments are surrounded by the cards of Wm. Jessup & Sons, manufacturers of steel and importers of iron, Sheffield, England; of Congreve & Son, of New York, agents of the Toledo Steel-works of Sheffield, England; of A. B. Sands & Co., importers of drugs, one of whose members, Maholon Sands, serves the Free Trade League disinterestedly as secretary; of John Clark, Jr. & Co., foreign manufacturers of spool cotton; of Van Wart & McCoy, the New York agents of Van Wart, Son & Co., of Birmingham, and of a dozen other English manufacturing firms; of F. W. Harrold, hardware, Birmingham, England; of Sampson & Bro., importers of foreign iron, of W. & G. Dutcher, of Sheffield, England, file and tool manufacturers; of Spear & Jackson, of Sheffield, England, steel saw-makers, and of Wm. Irving, of New York, agent for two foreign cutlery and edge tool firms, and of Wm. Shefflin, importer of drugs. Besides these there are the cards of several foreign insurance companies, but not of a single American producer of any kind. A noble set of backers, these, to teach American taxpayers what their true interests are. A number of these agencies are located in New York, on purpose to evade the payment of American taxes. We would ask our taxpayers to consider what the probabilities are that any of these English firms when consigning goods to their Ameri-



can agencies, upon which the custom house is expected to collect duties according to their value, will state those goods in their invoices at anything like their true value, when by understating them they can evade the payment of hundreds of thousands of dollars taxes to the United States government. What evidence, for instance, would a consignment from Jones, Robinson & Co., of Birmingham, England, to Robinson, Jones & Co. (the same parties) in New York, afford of the actual prices of the consigned goods, if a true statement of their foreign prices involved the payment of 50 per cent. duties, while a false statement involved the payment of less? Mr. David A. Wells, in one of his reports, states that many of these American agencies of English firms are established on purpose to evade the revenue, and that in many lines of goods their smuggling almost defeats the collection of the duties. The Congress Committee on Manufactures report that the smuggling and evasion of duties by false invoicing, through the English consignors and American consignees being one firm or partner or agents of each other, amounts to 20 per cent. of the fair duties. These are the class of people who assume to teach American taxpayers, through the Free Trade League, the great saving it will be to them to let in all their importations free of tax. What a sublime specimen of business impudence. Having thus introduced the inspirers of the "People's Pictorial Taxpayer," let us now look at its contents. The principal cartoon is entitled "How the tariff robs the farmer and every workingman to benefit the monopolists." What a holy sympathy these Sheffield iron-masters and New York smugglers have for the American farmers and workmen! They make no complaint in their own names. It is the precious farmer and workingman who finds his advocate in the British tool-makers and iron-lords! It is not to get rid of any tax *which comes out of their own pockets* that they raise this howl against the American protective policy. They will insist that they add all duties to their selling price, and hence do not suffer, and are in no way smitten nor affected by the tariff. How disinterested, then, is their benevolence in circulating at their own cost the "People's Pictorial Taxpayer."

It is only against the monopolists they aim! As if there were any monopolists more successful in controlling the markets than the New York importers, one of whom will often raise the price of some article in which he deals, by a week's grasping speculations, more than it was ever raised by any taxes imposed on it by the government.

This cartoon is framed on some words used by S. S. Cox in a speech in Congress, and which were borrowed by him from a familiar essay written by Sydney Smith, alluding to English taxation. As parodied by the Free Traders, this statement runs thus. We shall comment on each allegation as it is made:

"The farmer rises in the morning, puts on his *flannel shirt, taxed 68 per cent.*"

The italicized words, for clearer demonstration, are printed on a picture of the shirt itself, and each succeeding statement of a tax is illustrated in like manner. We stamp the above statement as *LIE THE FIRST*. There is no tax of 68 per cent. on flannel shirts, nor on flannel, nor has their price been raised or affected in that or any similar sum by the tariff.

The price of flannel is made up of the price of the wool which is raised by the farmer, and of the cost of weaving it into flannel by the manufacturer. So far as the cost of the wool is concerned, the farmer raises a hundred or ten thousand times as much wool as he wears. He sells far more than he buys. If any tariff has raised the price of wool by 65 per cent., then the farmer is the "bloated monopolist" to whom, according to the free trade theory, the duty has been paid. But let us see whether the price of flannels has been raised by any tax whatever or other cause by 65 per cent.

A T. Stewart, the New York importer, and the heaviest dealer in American flannels and woollens as well as in foreign, furnished the Revenue Department two years with a table of the relative prices of leading woollens in 1860 and also in 1869, wherein we find that Middlesex opera flannels averaged 47½ cents a yard in gold in 1860 and (50 cents in currency, or) 42 cents in gold in 1869. This finest quality of imported flannels had declined 10 per cent. in price under nine years' action of the tariff. The coarse flannels are almost wholly produced in this country, as they require very little labor, and their price consists almost wholly of the cost of the wool. Of these the flannels that sold for 18 cents a yard in 1860 sold in 1869 and still sell for 16 cents in gold, as shown by Mr. Stewart's same return. Twilled scarlets that then sold for 30 cents now sell for 29. Ballardville 4-4 White No. 1, then selling for 75 cents, now brings 65¼ cents, and other grades in proportion.

Nor can it be said that this diminished price of the manufactured flannels results from the farmer getting a lower price for his wool. The census of 1860 shows that the total number of pounds of wool carded in the United States in that year was 5,230,651, and that the cost of the raw material

used was \$1,756,125, being 31 cents a pound in gold. The average prices to-day range from 30 to 50 cents (in Illinois), the writer hereof having sold a considerable quantity of coarse wools from his farm in this State for 50 cents during the present year. The medium price would be nearer 35 or 37 cents than the 32 cents which prevailed in 1860. These facts prove that while the manufactured flannels are slightly lower in price, the wool of which they are made is slightly higher. Hence the assertion that the farmer is taxed 68 per cent. on his flannel is a bald and stupid lie, and the New York Free Trade League knows it to be a lie. What these New York importers are after is not to make the farmer's flannel cheaper, but to escape the tax they themselves pay on their own importing business, and a large share of which, as we shall show, they do not and cannot charge over to their consumers. We now come to lie the second and third:

"Trousers taxed 60 per cent."

"Vest taxed 60 per cent."

There is no direct tax on vest or trousers, but the assumption is that certain duties have raised their price 60 per cent. The same return from A. T. Stewart shows that Middlesex doeskins sold under free trade in 1860 for \$1.05 a yard and under protective duties in 1869 for 96 cents in gold. Broadbrook cassimeres that sold in 1860 for \$1.75 sold in 1869 for \$1.46. Spring cassimeres that sold in 1860 for \$1.12½ to \$1.25 sold in 1869 for \$1.14. Glenham sackings that sold in 1860 for \$1.05 sold in 1869 for 98 cents; and so on throughout the list.

But some Free Traders will ask, how is the tariff protective if it does not raise the price? They might as well ask, "how is a fence protective if it does not raise the entire level of a lot?" If a tariff gives the American market to American producers it increases their sales, and on increased quantities sold they can afford lower prices than they could afford on small quantities.

Before going further, it may be well to expose the fundamental falsehood out of which all these free trade lies emanate as a stream from their fountain. This is that Congress, and not competition, fixes the price of commodities. If Congress lays a duty on the importation of an article, then—though it may never in fact be imported—the free trade theory is that the price of the whole domestic supply of the article is raised by the amount of the duty. In proof that the Free Traders assume this preposterous lie as the basis of their arguments, we cite the following, and might cite fifty more, from this People's Taxpayer. One suffices:

"Let us now consider an example of a duty, levied not for

revenue, but for 'protection.' We will take the duty on iron. In 1868, there were consumed in this country 1,654,000 tons of pig-iron. The duty on iron was \$9 a ton, to which extent its price was increased. Thus, the people paid \$14,886,000, gold, additional, in the wholesale price, to say nothing of the vastly larger sum paid in the increased price of the manufactured iron. How much of this did the government receive? It got only \$744,300; for 95 per cent. of the iron was made in this country, and only 5 per cent. was imported."

The Free Trade League does not think it necessary to inquire whether iron is lower now than it was in 1860. It is Congress that fixes all prices, according to this sapient oracle! Were it to levy a tariff of a thousand dollars a ton on the importation of hay or sand, the shibboleth of the Free Traders would require that the price of these articles should rise by the amount of the duty. Suppose, for a moment, this were true, would the farmer lose more than he would gain by the existing tariffs. Let us see. The country imports about 2 per cent. of its butter as well as 5 per cent. of its pig iron. There is a tariff of 4 cents a pound on butter, from which government derived on the importation of 1869, of 6,685,093 pounds of butter, a revenue of \$267,403.75. The Protectionist sees that an importation of 2 per cent. cannot fix the price of a domestic product of 98 per cent., and he therefore affirms that the importers of this butter only got for it, after paying the duty, the same price they would have received had they paid no duty, viz.: the current domestic American price. If this were so, then the butter tax did not rest on the American consumer, but on the Canadian producer, of butter, and the quarter of a million of revenue was really paid by the Canadian farmers toward the support of our government. This is the truth. But on the free trade theory, that every duty enhances the price by its own amount and is paid by the consumer, and not only enhances the price of the part imported but of the whole domestic production, however great, this duty of 4 cents a pound on butter must have increased by that sum the price of the 800,000,000 pounds of butter produced in the United States as well as the price of that imported. This would inevitably follow if the duty on butter rests on the consumer. But if so, then the government received only a revenue of \$267,403.75, while the American farmers, being the "butter monopolists," received the remainder of the tax, amounting to \$32,000,000 annually. But this is not all. We imported in 1869 190,000 bushels of potatoes, which paid a duty of 25 cents per bushel, on which the government collected a revenue of \$46,458.81, while the farmers, in their capacity of potato monopolists, got 25 cents more for every bushel of potatoes raised in the United States, thus taxing the consumers of potatoes, in favor of



the producers, \$60,800,000. In the same way the farmers could be shown to have had the price of their grain raised 15 cents a bushel by the tariff, thus giving them a revenue of \$343,290,627.50 on grain in order that the government might collect therefrom a paltry \$954,616.46. Indeed, by going through the whole category of products of which we import a small part and produce a large part it might be shown that, if the Free Traders' theory of the effect of an act of Congress on prices were true, the increase in the price of all American products combined would exceed five thousand millions of dollars, or the whole value of the products of American industry; in other words, that the total earnings of the American people per annum are less than their annual taxes paid to monopolists of various kinds, and chiefly to the farmers, as they raise the larger share of the domestic products.

Having thus reduced the free trade doctrine of prices to an absurdity so glaring as to entitle it to be branded as a conscious and willful lie, we proceed to state, as nearly as possible, the true law of prices. The price of any article depends on the ratio of the whole supply offered for sale, to the whole demand on the part of persons offering to purchase. Any limited foreign source of supply, therefore, can only effect the domestic price in the ratio which it bears to the whole supply. If Canada furnishes 2 per cent. of our butter, she constitutes 2 per cent. of the supply which controls our price, while American butter producers constitute 98 per cent. So of pig iron. If the foreign supply of pig iron is 5 per cent. of our demand, then 95 per cent. of our prices of pig iron depend on our American cost of production. This being so, the importer of pig iron pays 95 per cent. of the duty on it, or, in other words, were the tariff removed the price would fall by only 5 per cent. of the amount of the tariff, and the importers would pocket, as profits, 95 per cent. of the duties they now pay to the government on pig iron. Well, therefore, may they send out "People's Pictorial Taxpayers to instruct American farmers in the economies of taxation." Applying this rule to the other articles in the Free Traders' cartoon, and we find the whole thing resolves itself into a mass of lies. For instance: The overcoat is marked as follows—

## TAXED.

|               |              |
|---------------|--------------|
| Cloth .....   | 60 per cent. |
| Buttons ..... | 40 " "       |
| Braid .....   | 40 " "       |
| Lining .....  | 60 " "       |
| Padding ..... | 150 " "      |

Of the cloth used for overcoats, the Middlesex beavers were returned by A. T. Stewart, in the return above mentioned, as selling in 1860 for

\$3.75 per yard, and in 1869 for \$3.54 in gold. The cadet cloths sold in 1860 for \$2.75, and in 1869 for \$3.25 in currency, which equaled \$2.71 in gold. Nor is the farmer's wife worse off than the farmer. For the Middlesex shawls, which sold in 1860, under free trade, for \$7.00 in gold, sold in 1869, under the duties alleged, for \$5.84 in gold. It becomes an interesting inquiry who paid the duties. We insist they were chiefly paid by the importers and foreign manufacturers, and that American competition was such that they never saw the time when they could add the whole amount of the duty to the selling price of the article and collect it all out of the American consumer.

We next reach lie the fifth, as follows:

"Draws on his boots, taxed 35 per cent."

Under free trade boots and shoes have never been imported in a quantity sufficient to exercise the slightest influence over their American price. In 1857, for instance, we imported 78,205 pairs, worth \$127,651, while in 1860, by the census, there were in the United States 12,486 establishments for this manufacture, having an aggregate capital of \$23,357,627, consuming raw materials worth \$42,728,627, employing 94,512 male hands and 28,514 female, who received in wages annually \$30,938,080, and who produced boots and shoes to the annual value of \$91,889,298, or nearly one thousand times the value of the quantity imported. Under free trade, therefore, boots and shoes were substantially non-importable, because we produced them cheaper than they could be imported. Indeed, our exports of boots and shoes amounted in 1860 to \$782,525, being six times our imports. As well, therefore, might we claim that a duty on ice, sand, pumpkins, or pig iron, determines its price as claim that a duty of 35 per cent. on boots and shoes raises their price by that amount, when we can export boots and shoes to most other countries and sell them in competition with the English or French article.

In 1867 no boots or shoes are included in the returns of dutiable goods imported, but the item, "All other manufactures of leather, 35 per cent.," which must have included them, amounted to only \$18,695, while our exports of boots and shoes in the same year, chiefly to the British colonies, where they sold in competition with those of British manufacturers, amounted to \$681,706. The lying mendacity displayed by the Free Trade League in pretending that the tariff on boots and shoes raises their price by 35 per cent. is beneath comment. They know better themselves, as we will prove by the following extract from the first page of the People's Pictorial Taxpayer, in which

they covertly admit the truth of the law of prices we have above laid down. They say:

"Some of our readers may not at once see how duties imposed on imported articles increase the cost to the people of the same goods made in this country, since the duties are not levied on them. The reason is, that when the quantity made here is not sufficient to supply the demand for it, the deficiency must be imported, for which the people must pay the foreign price, with the duty added, and our manufacturers raise their prices to the same extent.

"This necessarily follows *from the foreign article selling here, for if the American was not raised to the same price it would undersell the foreign, and the foreign could not be sold.* If the duties were removed, the manufacturers would be obliged to reduce their prices to the same extent."

In citing the above, we do not admit the truth of any part of it, as stated. But in the italicized lines the writer shows his knowledge of the fact that if an article is not imported it is proof that the American product undersells it. Boots and shoes were not imported, but were exported, under free trade; yet the Free Trade League, in contradiction to their own admission, claim that though the foreign article is not sold here at all, yet the domestic article is raised to the price of the foreign, with tariff added. The authors of such statements are deliberate liars, and it is the duty of such men as Wm. C. Bryant, who allow their names to be used by this league, to repudiate such manifest lies.

#### LIE THE SIXTH.

"Puts some coal taxed 60 per cent."

There is a duty of \$1.25 a ton on bituminous coal, of which our only foreign supply, near enough to be importable at a profit free of duty, is in Nova Scotia. Down to the year 1866 Nova Scotia coal came in free of duty. Our average import during the last five years of free trade in coal—viz., from 1861 to 1866—was 292,308 tons per annum, and during the next two years (1866-1868) we imported about the same quantity, viz., 283,312 tons per annum, which rate of importation still continues. These facts show, first, that our importation under free trade is not materially greater than under protection, and is about one per cent. of our domestic production, which amounts to 28,000,000 tons. This fact alone would suffice to show that the domestic supply fixed the price, or formed just 99-100ths of the controlling influence over the price. This being true, the importer of coal would get the full price fixed by our market without regard to his own cost of production. If compelled to pay duties, they would become in effect part of his cost of production, and he would be obliged to sell for the same price as if he paid no duties. Hence the duties would come out of his profits—not out of the American consumer of coal. The tariff would be protective in two ways; viz., first,

it would collect part of our revenue from foreign producers, while all "revenue tariffs," so called, collect their whole tax from the American consumers of the thing taxed; secondly, it would cause about 8,000 tons fewer of foreign and more of American coal to be sold in the American markets; a very trifling widening of the American market, but still worth something to the cause of American industry, since it effects no increase in the cost of coal to American consumers. As proof, first, that the price of Nova Scotia (Pictou) coal is fixed in amount by the price of American (Cumberland) coal; secondly, that it is not affected in price by the duty of \$1.25 a ton heretofore levied; thirdly, that that duty is paid out of what would otherwise be the profits of the Nova Scotian miners; and, fourthly, that the duty on coal results in saving American taxpayers the exact sum of revenue collected; we subjoin the following table, showing in the first column the actual prices of Nova Scotia coal for nine years, in currency, in Boston; in the second column the same prices reduced to gold; in the third column the profit of the Nova Scotian miners in gold, and the effect of the tariff to reduce their profits by the exact amount of the tax; and in the fourth column the price of Cumberland coal per ton in currency, showing that it has declined from \$10.32 to \$7.42 since the duty was imposed, while it had risen from \$5.06 to \$10.32 per ton under free trade. The table will bear careful perusal:

|                                 | Pictou, pr. ton<br>currency. | Gold Prices. | Gold Profit. | Cumberland,<br>per ton, in<br>currency. |
|---------------------------------|------------------------------|--------------|--------------|---|
| 1861, Free of Duty.....         | \$4 67                       | \$4 67       | \$3 67       | \$5 06                                  |
| 1862, " " ".....                | 5 60                         | 4 48         | 3 48         | 6 57                                    |
| 1863, " " ".....                | 7 40                         | 4 94         | 3 94         | 8 04                                    |
| 1864, " " ".....                | 10 40                        | 5 20         | 4 20         | 10 38                                   |
| 1865, " " ".....                | 9 00                         | 6 85         | 5 65         | 10 32                                   |
| 1866, Duty paid, \$1.25 pr. t'n | 8 54                         | 6 00         | 3 75         | 9 47                                    |
| 1867, " " ".....                | 8 10                         | 5 07         | 3 52         | 7 07                                    |
| 1868, " " ".....                | 8 16                         | 5 11         | 3 55         | 7 79                                    |
| 1869, " " ".....                | 7 88                         | 5 81         | 3 86         | 7 42                                    |

This explodes the monstrous lie of "coal taxed 60 per cent." We style it a lie, because there is not one single member of the Free Trade League that does not know the statement is false, and its officers circulate it not in the interests of American taxpayers, but as a means of procuring exemption for foreigners from all taxes on the goods they sell in this country in competition with our own. It is not only a lie, but it is a sneaking, smuggling lie, opposed alike to the spirit of American patriotism and the interests of the American taxpayer.

(TO BE CONTINUED.)



## FROM DULUTH TO PUGET SOUND.

The Northern Pacific Railroad is now in course of rapid construction from each extremity toward the center. Starting from the western end of Lake Superior, at Duluth, the route traverses centrally the great wheat-growing region of our continent; then passes through the heart of an immense area of stock and grazing country, where nutritious grasses cover the soil with perennial abundance; and finally makes its way through boundless forests of valuable timber to the tide-waters by two branches—one descending the valley of the Columbia River to Portland, the other proceeding to the main ocean terminus on Puget Sound—embracing a shore-line which promises to become, at no distant period, the lumber market of the world. Added to these extraordinary natural advantages are peculiar climatic conditions. Throughout the New Northwest, latitude is no index to the character of the temperature. In the entire belt of territory to be developed by this trans-continent thoroughfare, the least genial region is Minnesota, the yearly mean of whose thermometrical measurement ( $44.6^{\circ}$ ) coincides with that of Central New York, and gives an annual range from the summer heat of Southern Ohio to the winter cold of Montreal; yet, both in the average of wheat production per acre and in the magnitude of operations, she leads the sisterhood of States. Soon after the road passes the eastern boundary of Dakota, the summer isothermal line of Chicago crosses its track, diverges by a widely-expansive curvature far away into the British Possessions, including within its compass the grand Saskatchewan area, and returns to American soil not many miles distant from the Pacific coast. From the point of this intersection to those of destination, the route proceeds constantly through an ameliorating climate. Along much of the line in Dakota, myriads of wild flowers enamel the plains from April to October. Montana possesses still milder seasons, while Washington and Oregon represent the latitude of Southern Virginia. This remarkable softness of atmospheric condition, once generally doubted, but now established by a multitude of facts, is attributed by scientific men to three main causes—the low elevations of the mountain ranges as compared with those further south; the warm winds from the Pacific, which prevail in winter, and pour steadily far into the interior, without serious obstruction from the moderate altitudes of the intervening ridges; and the thermal ocean current, corresponding to our Atlantic gulf-stream, which strikes the northern part of the coast, and flows thence southward toward San Francisco, diffusing its moderating influences far inland. Upon these

tide-waters, where these calorific causes operate most powerfully, the frigid weather which besets corresponding latitudes on the Atlantic shore is wholly unknown, an evidence of which is found in the fact that summer flowers in open gardens on Vancouver's Island are not injured by frosts one winter out of four. Even in parts of Dakota the most delicate blooms of Eastern nurseries have been successfully transplanted, and now adorn many of the Western homes of that Territory. Within the same area, wild cherries, plums, grapes, currants, berries, and hops grow spontaneously and yield in fabulous profusion along all the brooks and streams.

The grazing region traversed by the road is of vast extent, spreading beyond the American boundary far into the British Possessions; is capable of supporting innumerable herds of cattle the year round, without need of artificial shelter; and, under proper irrigation, would prove fertile and remunerative farming lands. All this interior portion of our continent possesses an immense and unmeasured capacity for occupation and population. Of alkali plains, sand, and sagebrush, such as border the Union and Central Pacific route, there is next to nothing in this whole area, nor, indeed, on any other part of the line. As a stock-raising country, it abounds with natural resources whose value can hardly be overestimated; and when settlement and cultivation shall have developed its agricultural productivity, this region may be expected to become our continental wheat garden, as well as the great source of our cattle supply. Whether the fertility of the entire belt bisected by the road be considered from the stand-point of friend or foe of the enterprise, the testimony all culminates in a single opinion, which may be expressed in the words of Governor Stevens, who repeatedly passed over the route, and studied it in all its aspects, that *"not more than one-fifth of the land from Red River to Puget Sound is unsuited to cultivation, and that this fifth is largely made up of mountains, covered with bunch-grass and valuable timber, and filled with the precious metals."* Hon. T. S. Wilson, late Commissioner of the Land Office, gives the above conclusion the whole force of his official indorsement, in his report for 1869, and adds: "An immense agricultural area is here awaiting development. \* \* Each section of the road, as it is completed, will, from local traffic alone, find ample returns for its investment." It was the very magnitude and opulence of the land-grant conveyed to the company by its charter—sufficient, as was urged, to "defray every dollar of expense of building and equipping the road—that constituted, in the minds of the opposition, the

strongest argument they could use against the passage of the act of incorporation. Such concurrence of views, proceeding from hostile points of observation, relative to the great available value of the country intended to be traversed by the Northern Pacific railway, affords the highest assurance of the solid basis on which the undertaking rests.

After passing through the grazing district proper, the route enters the vast lumbering region of Oregon and Washington, whose surface in every direction is heavily timbered. This descriptive term, however, in the sense in which it is used in nearly all the Eastern States, conveys no idea of the immense and majestic forests which clothe the Cascade and Coast ranges of mountains. In size, quality and quantity of the product, these woods surpass those of all other countries. For lightness, straightness of cleavage, resistance to moisture, strength of texture, and retention of spikes and tree-nails, some of the kinds are unequaled. An Oregon fir often reaches an altitude of three hundred feet, or over eighteen rods; and out of such a one frequently have been taken eighteen rail-cuts. The common elder becomes, in that moist climate, a tree of ten or twelve inches in diameter, while the alder grows large enough for saw-logs. Trees are usual whose circumferences range from twenty to forty feet. Many times, one hundred and twenty thousand feet of lumber have been realized from a single acre; and it is not uncommon to obtain six thousand to eight thousand feet from a single tree. The varieties of timber adapted to general lumbering purposes are the red, white and yellow fir, cedar, spruce, hemlock, and, in some parts of the interior, pine and larch. Yellow fir is the main dependence when strength and elasticity are demanded. It enters into general use for building, fencing, bridges, wharves, piles, spars, and ship timber. Cedar is employed for finishing material, for posts, and in foundations where it will come in contact with the ground, on account of its durable qualities in such situations. An excellent description of ash is obtained along the streams and on the lowlands. Lumber, as yet, finds its principal market at San Francisco, and in the southern part of California, the agricultural portions of that State being destitute of timber. The cities and coast valleys, particularly, rely entirely on the saw-mills of Oregon and Washington Territory for building, fencing, wharf, bridge and ship timber. A large market for the lumber exists also at the sea-ports of Mexico, South America, Sandwich Islands, China, Japan, and Australia. Cargoes of the same product have been shipped from Columbia River to New York and to Liverpool with profit. This distant

demand, moreover, is rapidly increasing. Last year Puget Sound exported above one hundred and eighty million feet of lumber, twenty millions of laths and shingles, besides a large quantity of masts, spars, and piles; yet, even at this prodigious rate of annual consumption, experienced lumbermen estimate that the timber within one mile of the navigable waters of the Columbia cannot be exhausted by the saw-mill force now in operation during the present generation. As this calculation covers only the merest fraction of the illimitable forests which envelop that whole region, the supply must continue equal to the most extravagant demand for an indefinite period, ultimately creating a business that will amount to hundreds of millions of dollars, and giving steady employment, directly or remotely, to thousands upon thousands of persons.

Puget Sound, one of the western termini of the road, is a large inland sea, whose outlet to the ocean is through the strait of Fuca, in the north-western corner of Washington Territory—a channel eighty miles long, ten to twelve wide, and from twenty to one hundred fathoms deep, without obstructions or hidden dangers. This land-locked body of water consists of two arms, extending northward and southward from the strait, to the aggregate length of 160 miles, and dotted with islands. Both branches divide and ramify, until the shores are fringed with bays and deep-water inlets affording abundant harbors and secure anchoring ground, capacious enough to shelter the commercial marine of the world, and give safe refuge to vessels of the deepest draught and largest capacity. With its various indentations, the sound presents a shore-line of 1,833 miles. For 150 miles the mid-channel is more than 300 feet deep, without shoal, sunken rock, or other interruption.

Not content with these lavish gifts, nature has added others of a still more extraordinary character. While the Northern Pacific Railroad will connect our great lake navigation with the Western tide-waters by a line 500 miles shorter than that of the completed thoroughfare across the central part of the continent, the sailing distance between Puget Sound and the ports of China is 600 to 800 miles less than between San Francisco and the same places. In consequence of the warm equatorial current in the Pacific, combined with the prevailing direction of the winds, vessels from China, India, and Japan, are compelled to “make nothing,” as seamen term it, even when bound for a California harbor, until they are opposite Puget Sound, when they run southward to the port of destination. These are opulent and powerful advantages, which cannot fail to make themselves felt in the competition that must take



place for the possession of the ocean traffic with the western shores and adjacent islands of Asia.

Of still greater present, perhaps of greater future, importance, are the whaling grounds and salmon fisheries of our northwest coast. The whale fields of the Atlantic have been explored time and again, and are now nearly exhausted. Those of the Pacific are comparatively fresh, and need only the prompt access to market that will be afforded by the completion of the northern highway across the continent, to give an impetus to adventurous American enterprise in that quarter. The salmon is the principal fish of Oregon waters. It is noted among the most delicious of its species in any part of the world; and is so plentiful in its season that it has constituted the principal article of food for the Indian tribes of the region for time immemorial. Salting and smoking, pickling, and canning these fish have already become an important branch of local industry. So far, exportations have been mainly confined to San Francisco and the Sandwich Islands. Even with this limited market, 1,800,000 cans were put up during the season of 1870, on the Columbia river alone. To these resources must be added the cod fisheries along the coast of Alaska, now known to equal in extent and value those in the North Atlantic. With the opening of the new thoroughfare, these several industries must receive a rapid development, sending vast quantities of cod and salmon, of whale-oil and bone, to the interior, and bringing back a variety of needed products.

It is through such a productive belt of country, swarming with natural advantages at every advancing step, from the initial point on Lake Superior to the termini on Puget Sound and the Columbia river, that the Northern Pacific Railroad Company has secured a national land grant, comprising a right of way of 200 feet in width on each side of the track, with necessary ground for all auxiliary buildings, and twenty alternate sections per mile on each side in the Territories, and ten sections in the States, through which the road may run, including the coal and iron deposits within these limits, and the right to a free use of all construction materials needed from the public domain. This is equivalent to an average of nearly 23,000 acres per mile along the entire length of the line, aggregating more than 50,000,000 acres—an opulent endowment, placing the building, equipment and prosperity of the undertaking beyond peradventure.

Owing to the comparatively low elevations of the mountain ranges throughout the whole distance, combined with the signal advantages arising out of the existence of contiguous or inter-

secting navigable rivers at convenient intervals along the route, not only will the cost of construction be materially less per mile than it was on the completed line through the center of the continent, but the running expenses will be considerably smaller. The Union Pacific and Central Pacific thoroughfare has four main summits; the Northern Pacific will have only two. The highest altitude in the profile of the latter road is about 3,000 feet lower than the Sherman summit on the Union Pacific line. Nor is this an exceptional contrast; for the same broad difference in height above the level of the sea extends through corresponding stretches of some 900 consecutive miles. As regards elevations and gradients, the comparison immensely favors the northern route. When it shall come to a question of competition in the carrying of freights, as some day it must, this great superiority cannot fail to tell largely against the road which has so many high altitudes, heavy grades and short curves.

Another signal advantage is the small amount of snow-fall on the Northern Pacific line, when compared with that on the Union Pacific and Central Pacific. While the latter is compelled to a considerable and regular outlay to provide against this constantly recurring winter obstruction, the former, secure in its possession of a milder climate, is relieved of more than ordinary preparation and usual expense. A still more potent advantage is the difference in the soil. On the central route, over 1,200 miles are a barren, alkaline surface, worthless for any agricultural purpose; hence way freights or passengers are there out of the question, and the road all along that distance must be supported by the through business. Not so with the Northern Pacific. The country which borders its track is exceedingly fertile, and capable of supporting a dense population throughout its entire extent; and the local traffic, so profitable to a railroad, must ultimately augment to proportions that cannot well be overestimated. Referring to the copious resources of this favored belt of country, the Senate Committee of the United States, in their report of Feb. 19, 1869, say:

"There are, between Lake Superior and Puget Sound, and the mouth of the Columbia river, 500,000 square miles of territory, which is the winter-wheat region of this continent. It is rich in coal, iron, gold, silver, and copper, and is blessed with a temperature so mild, that countless herds of cattle range and fatten, through the winter, upon the natural grasses within ten miles of the summit. It is a region in all whose valleys peaches, pears, apples, plums, cherries, grapes and sweet potatoes have a rapid growth and complete maturity. It is a region so rich in grass, and so blessed in climate, that it has ever been the home, in winter, as well as in summer, of the buffalo, the elk, and the antelope: it has timber water-power and stone, and a population of 1,410,000 people."

This great wheat-growing region extends 500 miles north of the Northern Pacific Railroad, and 1,200 miles northwest of Lake Superior; while our own wheat-growing area reaches only about 600 miles west from Lake Michigan. Several thousand miles of navigable rivers traverse this grand agricultural and mineral country, either intersecting or running contiguous to the line of the road. When we consider, as a whole, the vast and diversified resources of this region, it is beyond the power of the imagination to calculate, with any degree of accuracy, the immense business that must soon be developed by the construction of a thoroughfare through it, with branches that will be followed by other feeders.

The principal of the mortgage bonds now being issued by the Northern Pacific Railroad is payable at the end of thirty years. In order to obtain a reasonable conception of the material progress that may be expected, within that period, throughout the New Northwest, let us go back three decades, and see what changes have taken place since 1840. Then Texas had not been admitted into the Union; the war with Mexico was a coming event; California was not even thought of as a territorial acquisition; nobody suspected the existence of opulent gold mines on her soil; San Francisco was a village of adobe buildings, the rendezvous of a few whalers and coasting vessels, and without high commercial expectations. Oregon was embroiled with the boundary question, did not have even a territorial government, and her inhabitants found no place in the enumeration of the census. Colorado, Washington, Montana, Nebraska, Nevada, Dakota, New Mexico and Utah had no boundaries nor dimensions, and, excepting the portion acquired by the Mexican war, were conglomerate parts of the public domain. Kansas was a howling wilderness; now she is a State, with 362,872 residents, and has an extensive railroad system of her own. Minnesota had no regular territorial organization, her inhabitants were not numerous enough to attract the attention of the census-takers, and she did not become a State until eighteen years afterward; now she has a population of 435,511, exceeds every other State in the production of wheat, and, in 1869, had 750 miles of railroad completed and in operation, with 600 more under construction, and 2,000 miles additional projected, involving an aggregate actual capital of \$23,550,398. Chicago, in 1840, had only 4,853 inhabitants, a total valuation of real estate and personal property for purposes of taxation of no more than \$944,370, and exported merely to the amount of \$228,635, and imported to that of \$562,106. To fill the picture, we need barely suggest the rebel-

lion. These, too, are but a meagre part of the developments of thirty years. If they have been so stupendous, viewed from their starting-point, what shall we predicate of the next three decades? When the Northern Pacific Railroad comes to pay off its mortgage bonds, what States, cities, towns, farms, industries, population, wealth, culture, will cluster along its track! Here even imagination falters, and deals in glittering generalities.

Sagaciously and wisely the company has decided to sell its lands cheap, to promote immigration, to encourage settlement, and to foster local development, as the best means to a speedy securement for their road of that way business which will be its most profitable patronage. This policy is likely to find reinforcement in the recent movement to enlarge the Canadian canals so as to admit of the passage of ocean-going vessels through to the lakes, without breaking bulk. Such a consummation would bring the tide of emigration from Europe directly to the doors of the Northwest.

Meanwhile working parties in force are pushing the line simultaneously eastward and westward from its several termini. Its steam-whistles will soon be heard upon the eastern border of Dakota. Last April trains were running over 125 miles of the completed track of the main trunk, starting from Duluth. Including its purchase of the St. Paul and Pacific Railroad, the company had 413 miles in operation nearly two months ago. Before the close of the present season, the length of the finished track will be at least 560 miles. Among the contemplated branches is one extending to Fort Garry, tapping the great resources of that fertile region.

To obtain the vast sums of ready money required for the work of construction and equipment, the company is negotiating the sale of first mortgage 7-30 gold bonds, of convenient denominations, either coupon or registered, as preferred. Principal and interest are payable in coin—the principal at the end of 30 years; the interest, every first of January and July after date, yielding a return, at the present premium on gold, equivalent to more than 8 per cent. currency. These bonds are secured by a first and only mortgage on all the property and franchises of the corporation, which, on the completion of the work, will cover more than 2,000 miles of road, with rolling stock, buildings and all other equipments, together with over 23,000 acres of land to every mile of finished track, constituting essentially a real estate bond and mortgage. In pursuance of a settled plan to promote settlements along the route, the company has made its bonds receivable at ten per cent.



premium for its lands at the lowest cash price—a feature which gives these securities the additional character of land warrants, with interest coupons attached. By the terms of the mortgage, the proceeds of all sales of lands are devoted to the repurchase and cancellation of the company's bonds, so long as they can be obtained in open market at ten per cent. premium or less. A circular of the company says:

"Safely assuming that the net earnings of the road will provide for the interest on its bonded debt, the sale each year of 287,000 acres of land, at the low average price of \$4 per acre, and the investment of the proceeds as a sinking fund at seven per cent. interest, will cancel the principal of the entire issue of first mortgage bonds (now being sold) before they fall due 30 years hence. This would leave the company, the road itself and three-fourths of its entire land grant, free from debt. That the sale of lands and the consequent cancellation of the company's bonds will be much more rapid than above estimated, there is of course no question.

"Messrs. Jay Cooke, of Philadelphia, and J. Edgar Thompson, President of the Pennsylvania Railroad Company, are the trustees of the general mortgage, who directly represent the bondholders, control the lands of the Northern Pacific Railroad Company, and have charge of the sinking fund."

Thus have we faithfully, and we believe truthfully, delineated the route of the road, the nature of the land grant, the characteristics of the climate, the capacities of the country, the probabilities of development, the plans of the company, and the specialties of the investment. The work is gigantic in conception, and will no doubt be gigantic in its influences upon the material progress of our continent. It promises well for the future. Its construction and administration appear to be under a wisely arranged set of checks and balances. With judicious management it should pay within a few years a fair dividend on its cost; for its endowment is magnificent, its location unequaled, its prospects of a paying business immediate and large.

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#### SCIENTIFIC.

—Were the eyes of each one to be opened that he might see the workings of the mighty invisible powers of matter, the vision would be more dread than that of the prophet's servant dismayed by the Syrian army. Like him, we would see the Mount full of horses and chariots of fire, assigning that poetic strophe to the lightnings which would appear bursting from every point. For, in fact, the world is a magazine of electricity, whose direct manifestations are but the scratching of a match compared to the vast silent force which lies waiting about us. The harmless, grateful vapor of a summer fog is charged with electricity which let loose would burn aqueous matter, gases, nay, sweep the earth itself from sight in awful conflagration. Were the relations

of the elements composing water for an instant changed, the electricity liberated would convert the ocean into a gulf of fire. Electric discharges are continually taking place invisible to the eye, but detected by the susceptible plate of the photograph. A picture of a bronze statue at Berlin, taken some years since, bore witness to discharges from prominent points of the figure at the moment of the process, which were revealed by the high power of the electric light on the silvered plate, though unseen by observers. The aurora, with its tremulous, daring and lovely light, is the veil under which nature transmits intolerable electric force from pole to equator. The iceberg locks in its frozen heart more potent fires than those of the volcano, for the electricity of a single berg, if developed, would suffice to set the upper depths of air blazing. Yet we walk among these perilous repositories, unconscious of the fearful forces lying in store on either hand.

—The difficulty found in welding copper, due to the formation of non-fusible oxide, has been overcome by using a welding powder which, yielding phosphoric acid at a red heat, removes the oxide as slag. The best method of treating copper for a weld is to heat it in gas flame, to prevent the contact of solid carbon, which would form phosphide of copper and prevent welding. When red-hot, strew plentifully with a powder formed of one-third phosphate of soda and two-thirds boracic acid; heat the copper to a full cherry-red or yellow heat, and bring it instantly under the hammer, when it may be welded like iron. But as copper is much softer than iron at the welding heat, the parts must be shaped so as to resist the blows as well as may be, and it is well to use a wooden hammer, on account of its lightness. Strips of copper-plates may be welded and drawn into a rod; chains may also be made of links welded from thick wire.

—Office floors darkened by dirt may be satisfactorily whitened at the spring cleaning by washing with hot lye of caustic soda to remove any grease, and when nearly dry moistening with very dilute hydrochloric acid, and then with a thin paste of hypochlorite of lime, left on over night. When washed off in the morning, the whiteness of the floor will be equally surprising and delightful. Stone-house fronts are cleansed by throwing against them a jet of water under steam pressure. This method is cheap, and does not injure ornamental parts. Aside from the clean and fresh appearance thus secured, it is calculated that if the walls of all the buildings in London were kept clean, instead of being grimy and dark from top to bottom, a gain would be obtained of half an hour of daylight out of every twenty-four.

—Old prints, engravings, and manuscripts discolored by time, or soiled or stained in any way, may be perfectly restored to their first freshness and purity by bleaching in a closed vessel over the fumes of ozone, evolved by keeping phosphorus in warm water for eighteen hours. The print or paper to be restored is rolled up and suspended by a platinum wire over the fumes, and allowed to remain for at least twenty-four hours. The acid absorbed by the paper must then be removed by rinsing it in fair water and in a soda solution, finally spreading it on inclined glass plates, over which a thin stream of water is made to flow for several minutes. When dried between leaves of blotting paper, under a press, the print will regain its fair appearance and its smoothness. Ozone, however, does not affect oil spots, metallic colors or printing ink, unless after very long exposure. Ink is so perfectly removed that the paper seems never to have been profaned with the pen, and ozone acts more quickly than chlorine.

—Magnificent grays of all shades are dyed with aniline, and such is the strength of its solution that a skein of silk or wool is dyed by five drops of the liquor. Aniline and arsenic acid are the foundation of the color.

—The naturally colored marbles for the decoration of interiors are almost superseded by the artificial ones, which boldly imitate the rarest specimens of antiquity. It is supposed by many that these were colored by hand, and their rich clouding and veining is credit due not to nature but to art. The Brandon marble, of Vermont, is the purest known, and our red Tennessee marble furnishes showy panels for corridors, though its clouding is too broken to have the finest effect. The Egyptian marble, which is more splendid than any other known, with the gold veins breaking its black surface, is really an Italian variety. The Sienna is the best known marble of Italy, its color a pale buff, sometimes solid in tint, sometimes clouded. The Pyrenees have a marble very fine in quality, dull red and dove colored in broad shadows. The Lisbon, a Portuguese marble, is flushed with rose color, which suits it for the most ornamental uses in cabinets and boudoirs; it is also found in dove and slate colors. Green and shaded marbles in deep warm yellow are found in Spain. Imitations of these are made, either by coloring the surface of the slab, or by immersing it in a shallow bath of color which penetrates to the heart of the stone, so that on breaking it is found to be of the same color all the way through. Time, it is said, only adds to the beauty of this artificial stone. But in the name of all good taste let there be no more use made of glaring malachite green, ruby and purple marble, such as are

seen in show-rooms and a few vulgarly gorgeous parlors; but let the dictates of nature be followed, which always produce subdued shades in stone, which do not force everything out of harmony, or, as the French say, “swear at” their surroundings.

—It is found that one cord of wood will manufacture eight hundred pounds of paper. One ton of straw gives seven hundred and fifty pounds. Wood suffers a waste of ten per cent., straw from thirty to seventy per cent., according to the kind of paper made. There seems to be no question of superiority between the two materials—local conditions determining their precedence. The very best paper that can be made without the addition of rags seems to be that made from equal parts of wood and straw. Four tons of paper are manufactured daily at the largest paper mill in the United States. This paper is sized in the ordinary manner; 200 pounds requiring only one pound of glue.

—One of the obscure points of science, says an exchange, is the cause of the harmony of color always observed in flowers. When two colors are found they are generally complements of each other. The pansy is yellow and purple; in fact, yellows and purples generally go together in our garden flowers. A splendid example is afforded by the large *iris gemarica*, the flower-de-luce of our gardens. From the white base of its petals, the colorless sap passes into the petals, which become a gorgeous purple, while the beard of the petals becomes at the tip a very rich yellow, though the lower part of each separate filament is not of the purest white. What chemical or physical law determines the arrangement of colors is not yet discovered. French chemists say that the tints of flowers are due to cyanine, xanthine, and xantheine. Cyanine is a vegetable blue, which is reddened by acids. A development of vegetable acids in a flower would then turn the blue to rose color, while a scarcely sensible quantity would produce purple. Xanthine is a yellow from the sunflower, and xantheine the yellow of the dahlia. There probably are other coloring substances.

—The surface of this earth is nothing but one huge photograph, on which is delineated all objects, and all passing events. Every object is continually emitting rays which may be invisible to our eyes, but which are well-marked and definite, and might be rendered visible if properly developed, as photographers call it. Sometimes these photographs become so far developed as to be visible to the human eye; thus a man in San Joaquin, Cal., has a surveyor's instrument, on the front lens of which there is plainly seen a beauti-



ful landscape, with all the varied hues of nature. Fifteen years ago, according to the owner's account, the instrument was left standing on the plain in a scorching mid-day sun, fronting a woodland. When again brought into use, a correct picture of the fronting woodland, with all the various colors of the landscape, was photographed on the lens, and has remained unchangeable to the present time.

—Several inventors in different countries are attempting to utilize the heat of the sun's rays, and to construct a *sun-engine*. Many people shake their head at this idea, and ridicule the very idea of success. But they are certainly unacquainted with the stupendous force at disposal, the amount of which has been accurately computed by Pouillet and other modern philosophers. To convert one pound of water from zero to steam requires 637 centigrade units of heat. The researches of men of science have proved that every square centimeter of the earth's surface receives not less than 231,675 centigrade units of the sun's heat annually. Forty per cent. of this is absorbed by the surrounding atmosphere, and sixty per cent. reaches the earth. This gives seven centigrade units received per second on each centimeter, so that 91 square feet of the earth's surface would receive heat enough every second for the vaporization of one pound of water.

—The prevalent opinion that iron when exposed to moisture must corrode is shown to be erroneous. Cannon sunk in Lake Erie during the war of 1812 were found almost uninjured when taken up forty years after. Three of the iron gates at Sheerness have resisted the action of salt water forty years, and the fourth was only attacked in its lower portion, by galvanic action caused by the contact of a lead facing. Some of the cast iron piles used in the Margate jetty in 1831 were taken up in 1853, and sold for the same price as new pig iron, as sound as new, while other piles left standing there are now in perfect condition after thirty-eight years exposure. The subject was very fully treated in 1862 by the London Institute of Civil Engineers, and the unanimous opinion now is that the durability of iron depends on its quality and on nothing else. The corrosion depends on the homogeneous surface of the metal. Gray iron, having a good surface, will not decay in salt water, and piles of this are used extensively in submarine works. Mr. Webb, the ship-builder, expresses the opinion that strong iron of proper quality will resist the action of salt water for an indefinite time. Gas and water pipes are frequently made of the worst material, soft, open-grained, and showing large crystals; consequently, when taken up, they are found oxydized in knobs

of tubercular form. The best material should be used for piping, not the cheapest. The pipes of the Mahattan Water Company in New York, laid down in 1829, when taken up forty years afterward were, many of them, as sound as when they left the foundry. To secure against corrosion the iron should be as hard and close-grained and even in texture as possible. The carbon must be well combined, and not like graphite; the surface must not be porous. White iron of superior quality may be regarded as imperishable, provided it is not in contact with other metals so as to produce galvanic action.

—Mr. Bevan found that when two cylinders of dry ash, each an inch and a half in diameter, were glued together and then torn asunder, after a lapse of twenty-four hours, it required a force of 1,260 pounds to separate them, and consequently the force of adhesion was equal to 716 pounds to the square inch. Good glue unites pieces of wood with a strength which leaves nothing to be desired. It should be free from all foreign substances, and from the least taint of putrefaction. The only means by which the latter defect can be recognized is by moistening it, as glue which has begun to decay at the factory may not have any unpleasant odor while dry. With care to keep it pure and not to burn it in melting, glue is as strong as any cement known. The thinner the layer applied, so that it comes in intimate contact with the wood, the stronger will be the joint. The addition of nitric acid or vinegar, while they keep glue from becoming solid and from molding, injure its strength. White lead added to glue is said to strengthen it, as well as to render it water-proof. A little oil of cloves will prevent putrefaction. This withstands heat and alcohol, and is well adapted to leather, but will not withstand boiling water well, as that softens the glue.

—A cement of great adhesiveness is made by mixing six parts of powdered graphite with three parts of slaked lime, eight parts of sulphate of baryta, and seven parts of linseed-oil varnish, stirring the liquid to uniform consistency. The engineers of Leipsic use the following compound as a strongly adhesive cement; five parts of powdered clay, burnt; two parts of iron-filings, free from rust—that is, of the so-called *limaturi ferri*; one part of manganese; one-half part of common cooking salt; and one-half part of borax. Pulverize these finely and mix with water to the thickness of moderate paste. This withstands water at a very high heat. A second cement consists of a mixture of manganese in powder, and very finely powdered zinc-white, which may be reduced to a thin paste in any ordinary glass

vessel, by the addition of a little water. This, if speedily used, forms a very hard cement, resisting hot water. That clever and invaluable journal, *The Manufacturer and Builder*, will please take the credit which belongs to it for the suggestions adapted above.

—The so-called jet ornaments, in which ladies delight, are nearly all made in Bohemia of a fine black glass. Indeed, the glass is preferred by many to the real jet, which is frail in comparison with its cost. The compound of this black glass is a mixture of protoxide of iron, phosphate of lime and charcoal in excess added to the ordinary materials. Its properties are such that it may be used for boiling liquids without risk of breakage. Basalt or lava is used with or without the protoxide of iron.

—The electric light enters into competition with sunlight, not only for producing photographs, but in its influence on vegetables. It enables plants to secrete oxygen, and actually causes flowers to unfold after they have closed for the night. A branch of aquatic plant placed in water containing carbonic acid, under the electric light, gave bubbles of oxygen, as it did when exposed to the sunlight, only in less degree.

—A mass of metal of a ton's weight was unknown before the Christian era. Now those in cast-iron up to 150 tons are made in any form and turned and bored with most perfect accuracy.

—A solution of shellac in ammonia, concentrated by exposure to the air, is found a very useful solvent for aniline colors. This is applicable either to wood or paper, and is water-proof as well as brilliant. For dyeing wood, marbling paper, for print colors, addressing ink, and water-proof coating, it has no superior. Aniline yellow and carmine mixed with the shellac solution make a beautiful red ink. Water-colors mixed with the solution are more brilliant and durable as oil paintings. It is made of 1-12 sal ammoniac, 3-12 shellac, 8-12 water, allowed to stand twelve hours, and boiled and stirred until dissolved. It is a good dryer for paint.

—Chemistry bends its aid to the vanity as well as the art of man. Per-oxide of hydrogen, formed by adding amalgam of zinc to distilled water, is used to bleach the hair to the fashionable blonde tint. Sulphate of soda, and waters containing that mineral, are taken to reduce corpulence, and sulphate of quinine is used to restore eyebrows or hair lost by fire. Collodion, tempered with a few drops of glycerine, forms an elastic skin which hides wrinkles and forms a basis for the operations of the cosmetic artist. The aniline inks—carmine and rose—make exquisite and lasting dyes for the lips and finger-tips. Two prob-

lems now occupy the attention of toilet chemists, the first of which is to discover a preparation which will impart a lasting curl to the hair; the second, a wash which will turn the hair completely and beautifully white. It is true that the latter is a desideratum which has been eagerly sought for in Paris by amateur *savans* who wished to assume the venerable appearance suggestive of extreme study and experience. The fortunate student who solves either enigma will find his reputation made.

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#### REPLY TO THE "ILLINOIS FARMER."

We publish elsewhere the views of the well-known "Illinois Farmer," in the *Iron Age*, upon the future policy of Protectionists in case the Revenue Reformers shall develop a working majority in any future Congress. The "Illinois Farmer" ventures to propose that, if the Free Traders develop strength enough to defeat the Protectionists on any point, that the latter unite with the former to repeal every duty and give the country absolute free trade. The proposition is wholly impracticable, politically, and, if practicable, would answer no good end. On this point we hold, with the lamented Lincoln, that "it is time enough to cross the river when we come to it." The President and Senate of the United States, and the Republican majority in the House of Representatives, are firmly Protectionist. The Senate could not be changed under two years, and is not likely to be changed at all. If the Revenue Reformers in the House choose to unite with the free trade Democrats in caucus, which they are not likely to do, and at present dare not do, it is, in the first place, not certain that the Democrats would accept their Union in any other form than as an accession, out and out, to the Democratic standard. This would be the death of every Revenue Reformer who should attempt it. But, even if all the Revenue Reformers in the House were prepared to make the final plunge into the Democratic party, they could not pass a bill or repeal a duty for want of the Senate. Protection, therefore, is *in possession* of the Government, and all it needs to do is to retain its hold upon the people. The thing to be done is not to be hanging out signals of distress when the quarter-deck is ours, and our men are at all the guns, nor can we consent to talk of giving desperate votes, in league with Free Traders, to ruin the country in order to show that free trade will ruin the country. The little we can now add to the facts of history, by demonstrating anew the folly of free trade, will be utterly lost on men who derive no profit whatever from the examples already furnished. "If they would not hear these, then they



would not hear though Moses and the prophets should speak to them." Besides, if free trade were brought about by Protectionist votes, though cast in pure spite and against their convictions (if we can suppose the Protectionists capable of any such plot), why would not Protectionists be as responsible for the ruin wrought upon the country as if they were Free Traders by conviction; and, if the interests of protection can, by any indirect mode, require that Protectionists shall vote against their convictions, in order that the ruin that may result shall prove the truth of their convictions, how can protection itself evade its just responsibility for these recreant votes? The whole proposition is in conflict, not only with the principles of protection, but of human nature. It overlooks the element of conscience in the Protectionist Congressmen. It assumes them capable of voting against their conscientious judgment, for the ruin of the country, in order to vindicate the correctness of their judgment. Protectionists could not vote in accordance with any such ethical notions. While the "Illinois Farmer" doubtless advocates them seriously, as a Protectionist policy, they are no more in accordance with sound Protectionist views than the other rock upon which some former Protectionists have stumbled—that, if they could not have a prohibitory tariff, they would vote for free trade.

The one policy of Protectionists in Congress is to meet the Free Traders in detail on whatever ground they choose to fight. If they attack the tax on salt, meet them by defending that particular tax, and so of those on coal, lumber, iron, &c. If they assert that protection raises prices, even temporarily, be sure you find out whether it does or not, before yielding that point and falling back on the reserved ground that it increases production. For, in hundreds of cases it increases production immediately without raising prices. If they claim that the consumer pays the duty, meet them right there, and show, if true, that he does not, but that it is paid by the foreign producer or importer. Protectionists are too cowardly in their mode of fighting this battle. They fall back too quick on their reserved ground, that protection promotes production, without defending the outer points of attack. What we need, therefore, is an efficient distribution of thorough tracts on protection, which shall enable Protectionists to meet Free Traders on their own points, and disprove their leading premises, relative to the effect of tariffs on prices. Such are THE BUREAU Pamphlets. We have already sent out 400,000 of them. We need to send out a million more within the year. Wherever these go, the taxpayers learn that a protective duty is not neces-

sarily a tax on American consumers, that it does not, in most cases, raise our home prices, but that, as a mode of taxation, it is the only one which collects revenue for the support of our government from the foreign producers of articles which compete with our industries.—[ED. BUREAU.

ROCKFORD, ILL., March 25th, 1871.

To the Editor of *The Iron Age*:

DEAR SIR—As you are aware, I have said nothing in my letters to you for many months past on the subject of free trade and protection. My reason for it is not that I have thought less about it than heretofore, but that I concluded I had blown my penny whistle quite enough for the good of the cause. I have read every thing that has been written in favor of free trade, or what is now sugar-coated down to "revenue reform," that I have been able to lay my hands on, and I find nothing new. It is the same old story of "buy where you can buy the cheapest," "down with the bloated monopolists, who are making the rich richer and the poor poorer," &c. The Protectionists have not been idle. Their arguments are concise and to the point, not one of which have I seen answered by a free trade speaker or writer. Those worthies have not, dare not, and can not meet the Protectionists fairly and squarely on the real issue: the effect of the two systems upon the country. The Free Traders *know* that under protection this and every other country has prospered, and all classes have been benefited. They *know* that but for the protective tariff of 1861 this country could not have sustained itself during the war of the rebellion. They *know* that under a "tariff for revenue" even, not free trade, this country has always come to grief and ruin. They *know* that under low tariffs the country has always been flooded with importations from other countries, and that national as well as private bankruptcy have been the result, just as certain as night follows day. They *know* and dare not deny it, that they are working in the interests of foreigners and against our own people. Their leaders know all these things as well as I do, and their only object is to ride into power by deceiving the people with such senseless sophisms as I have quoted. But the real truth is, they are traitors to their own country—public enemies, who are working for the benefit of other nations. I use strong language, but I challenge successful contradiction. The Chicago *Tribune* would to-day, if it had the power, close every iron manufacturing establishment in Illinois and compel us to get our iron from England. It would, if it could, compel us to export every pound of wool grown in this

country, and import all the cloth we require. I mention the *Tribune* only as the exponent of this class. Every free trade paper and speaker in the country advocates the same doctrines. These free trade papers, speakers, and leagues are, directly or indirectly, in the pay of English manufacturers. They are working for their employers. This they deny, but it is true, nevertheless. It was true when James K. Polk beat Henry Clay in 1844, and it is true to-day. Free trade is the life-blood of the British Empire; without it England, sooner or later, goes under; hence her statesmen of all political parties, how much soever they may quarrel over other minor topics, are united on this. They never sleep. They are always on the alert. Their hirelings occupy every field. Where they have the power, as in India, they exercise it without leave. Where they have not the power, as in Germany, France, and this country, they use their gold to subsidize the press, to scatter broadcast tracts by the million, to poison the minds of the unthinking and easy-going masses, who never look beyond their noses to see that certain causes *will* produce certain effects. In this country they have found that our people understand what "free trade" is, and are opposed to it, hence they "mollasses" it over and call it "revenue reform," thinking thereby to catch the unwary, which, in too many cases, they are doing. To all such I would say, be cautious how you play with edged tools; fire is an excellent servant to warm your houses and cook your food, but don't let it get the mastery over you.

Now, so far as this free trade and protection business is concerned, I am quite tired of so much talk about it. Talk is very well for a while, but I now propose *action*. I propose that we measure swords with these free trade gentry. This I propose to do through the ballot-box. Let us test this question before the people, and settle it once for all. The two great political parties in the country dodge the question entirely. I, therefore, propose that we shall have a party of our own—a protection party—and that we stand or fall by it; that, whenever a Congressman is to be elected, we shall vote only for a protective tariff man, be he Democrat, Republican, Radical, or Conservative. I am as radical a Republican as can be found, but I here pledge my fellow-protectionists throughout the country that I will never vote for a Republican who is a Free Trader; and I *will* vote for a Democrat who is a Protectionist; and I tell you, if every Protectionist throughout the country would do this, we should quickly settle this question, for I feel sure that a vast majority of the voters in the country are Protectionists, and will so show

it if they have an opportunity. If I am wrong, and the country should vote against us, and in favor of free trade, under the guise of revenue reform, I shall advocate free trade in earnest—no revenue tariff, no milk-and-water half-way measures, but real *bona fide* free trade with all the world; a repeal of all duties on imports, and direct taxation to support the government and pay the interest on the national debt. This is no new idea with me. I have conferred with many of my protection friends about it, and I find there are thousands and tens of thousands of voters in this country who are of the same opinion. We are entirely agreed, if the country votes for free trade at the next Presidential election, by choosing a free trade President and Congress, in selecting our Congressional candidates, we shall have that point distinctly settled—that, if the majority is for free trade, they will, by holding the balance of power between revenue reform and absolute Free Traders, throw their vote for an entire repeal of all duties, so the country can enjoy, to its fullest extent, free trade, pure and unadulterated. I advocate this because it is right; it is honest, and no cheat. Our government is a democracy, where the people rule, and I always yield most cheerfully and willingly to their decision. But I am opposed to fraud in any shape. I am opposed to all kinds of trickery; therefore, if the country says it wants free trade, and the majority so decide, I shall do all I can to furnish it to the fullest extent. Then, when wheat sells for 40 cents per bushel, pork \$1.75 per 100 pounds, fine Merino wool for 20 cents per pound, fresh beef for \$1.50 per 100 pounds, good milch cows for \$8 a head, good work-oxen for \$30 a yoke, and the Legislatures pass "*stay laws*" to prevent the collection of debts, as was the case in 1838-39-40—when we began to feel the full effects of the free trade revenue tariff of 1833, this generation will learn, to its cost, as we of that time did to ours, the true meaning of free trade. I do trust that our protection friends throughout the country will unite with me in what I have proposed, to vote for no man for Congress who is not a Protectionist, with this positive and unchangeable understanding: that, if the majority in the next Congress are Free Traders, our protection Congressmen shall unite with the most *ultra* of their Free Traders, and repeal *every law* on the statute book levying duties on foreign importations—so that the country shall have free trade in deed and in truth.

Yours, &c., AN ILLINOIS FARMER.

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PROTECTION to home industries means competence to the workingman, with leisure for self-culture and means to educate his family.



## THE FREE TRADER'S COAT ARGUMENT.

In its recently published campaign sheet—the *People's Pictorial Taxpayer*—the *Free Trader* reproduces, among other adroit appeals to ignorance and prejudice, an argument which was a great favorite with Gen. Brinkerhoff, until it very unexpectedly encountered an overwhelming and most humiliating public refutation. This argument consists of the wood-cut of an overcoat, the cloth of which is labeled as taxed 60 per cent., buttons 40 per cent., braid 60 per cent., and padding 150 per cent. The Ohio stump-speaker, however, made a much more impressive and alluring use of this bit of sophistry. He had a garment of foreign manufacture, which he was accustomed to wear for popular exhibition in his oratoric peregrinations, giving it the argumentative force and effect of Vallandigham's double eagle of United States mintage. At the opportune moment in his harangue, he would concentrate attention upon the article of clothing, and make the most of his illustration. We cannot repeat his exact language on these occasions, but this was his mode of reasoning:

"My friends," he would say, with insinuating unction, "this coat was made in London, in England; the cloth cost so much per yard in that city, it would cost so much in America; so much for buttons, braid, padding, lining, and so on, here; so much for the same articles there. In London, this garment was bought for \$11; in Cincinnati, it could not be purchased for less than \$28. See how you are robbed by a protective tariff. It compels you to pay two and a half prices for one of the necessities of life. It puts its hand in your pocket, and clutches away your hard earnings to swell the opulence of manufacturing nabobs. It is a tyrant that oppresses you, one and all, in the prostituted name of beneficence. It is an enemy to you and yours, that ambuscades the rights and interests of labor, under the mocking pretense of guarding and extending them. It is a foe to normal development and progress, and an ally of monopoly and fraud. Just see what you lose by being deluded into opposing free trade, your best friend. Were that economic policy the rule of the land, you might save \$17 in the purchase of a coat, to say nothing of the saving in the purchase of many other commodities. Why, then, should you stand in the way of your own advantage, merely to pour a stream of wealth into the pockets of a favored few? Why should you oppress yourselves with taxes, to make the rich richer and the poor poorer?" And so on, to the end of the antithesis.

Upon persons of contracted understanding, who are easily misled by surface indications, this prac-

tical appeal to the senses—this adroit touching of the pocket-nerve—made a very visible impression. For its use, Gen. Brinkerhoff won golden opinions among his free trade cronies, and felt as proud as if he had discovered the philosopher's stone. He could not make a speech without introducing his forcible illustration, in one or another of its forms. It was to him an inexhaustible arsenal of argumentative weapons. He challenged the Protectionists to spike his great Paixan gun of sixty-four pound effectiveness.

It happened one night, after the speaker had discharged his piece of oratoric ordnance, with accustomed *eclat*, that a man in the audience arose to ask him a question. "General Brinkerhoff," said the interrogator, "you have kindly informed us of the cost of that coat as a whole, and of its cost in detail; but there is one point upon which you have not yet enlightened us. How much was the journeyman tailor who made that garment paid for his labor?" This interruption was a shot between wind and water. The General clearly saw the point, but did not see any way to evade the issue. He managed, however, to stammer out that he did not know the exact compensation, but believed it was somewhere between one dollar and a half and two dollars. "Very well," replied his interlocutor, "let us take the highest figures. Now," continued he, "I am a practical clothier; I have had many years' experience in my business; and I consider myself a competent judge of this matter. No tailor could make such a coat, all by himself, in less than three days. That would give four dollars a week as his wages. Let me ask you how long it would take him to buy a coat at \$11.00, while receiving such wages, and how long would it take the American workman at the wages *he* receives? In the former case, a man would have to labor very nearly three weeks to make the purchase at eleven dollars, while, in the latter, he could earn money enough in considerably less than two weeks to make the same purchase at twenty-eight dollars. Under these circumstances, which of the two men would be better off and most independent? If Protection secures to us the more desirable condition, why should not we continue to support its principles at the ballot-box?"

General Brinkerhoff fully comprehended that the hurricane of hand-clappings which followed this explanation was not intended as a compliment to himself personally, nor to the impregnability of his logic. Indeed, he felt the rebuke very keenly, and found it convenient ever afterward to abstain from making it a prominent feature of his mass-meeting eloquence. Now the stale argument, furnished anew, reappears in the

*People's Pictorial Taxpayer*, to do itinerant duty in behalf of Free Trade among the homes of the people, where the troublesome clothier of the olden time is not likely to intrude to spoil the intended effect. But ordinary justice, at least to the journeymen tailors, requires that the representative coat so elaborately labeled with the enumeration of tariff charges, should be placarded with one item more, giving the amount paid to the foreign workman for making such a garment. With this emendation, a marked copy of the sheet should be placed in the hands of every journeyman tailor in the land, who could then determine for himself the extent of benefit Free Trade is likely to confer upon him individually, and upon the craft collectively. The question arises, what advantage would such a loss of purchasing power be to the community in general?

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#### THE UNIVERSITY OF CHICAGO.

A general impression exists that practical business and scholarly learning have little sympathy with each other, and that they rarely unite in the same men. Certainly the great business centers of the world are not always noted for their educational institutions, though the Universities of Paris, London, and Edinburgh, prove that density of population may coexist with the most ardent devotion to learning and great success in education. But more frequently smaller towns, like Oxford and Cambridge, in England, or some suburb like Cambridge, near Boston, convenient to the advantages of a great population, but removed from its activities and temptations, achieve fame in connection with their institutions of learning. Shaded retreats and quiet groves are certainly the favored haunts of the deities who preside over learning, whether classic, polite, or practical. But have you ever visited the grounds surrounding the University of Chicago, on any pleasant day in spring or summer, and witnessed the groups of young men, book in hand, reclining under the shade of the green old oaks, taking in the classics, the pure air of Lake Michigan, and the songs of the birds, in one common inhalation of learning, health, and melody? If not, you would fail to catch the noble inspiration which stirred the heart of the lamented Stephen A. Douglas, when, walking among these oaks and over this charming greensward, fifteen years ago, he determined to found here a monument more enduring than the fruitful contests of his political career. With that blending of the ideal with the practical which marks all true originality and greatness, he mused to himself, "Here, where the distant hum of the future metropolis of

the Northwest, perhaps of the Union, is faintly audible, like the murmuring of far off streams; here, where the air is fragrant with purity, and the quiet shade of these green oaks may come to be classic as the sacred old elms of Yale or the groves of the academy where Plato lectured to the youth of Athens; here, where the vicinity of trade, commerce, the courts, and all the activities of life, shall prevent the unnatural divorce which has too often existed between science and life, between learning and business—here I will found a school of universal science, as the most noble labor of my life, and under its shadow I would be buried, leaving it as the most enduring monument to my memory."

Chicago and the Northwest needed just such a donation and benefactor to rescue them from the accusation of utter materialism; which, in its best estate, must imply an entire devotion to the means, and oversight of the great ends and uses, of life.

Impressed with these inspirations, and endowed with a heart as generous as his views were comprehensive, Mr. Douglas, in 1854, offered to donate a beautiful grove of ten acres, on the southern outskirts of the city, near the Lake Shore, as the site of the present University. Two years afterward, the site was conveyed to Rev. Dr. J. C. Burroughs in trust, and, on July 6th of that year, a meeting of prominent citizens was held and a preliminary organization formed. Within two months \$100,000 were subscribed, and the subscriptions have since reached \$250,000. In April, 1857, the University was chartered, trustees and regents elected, and an Executive Committee empowered to proceed with the erection of an imposing stone structure, in the Norman style of architecture. The commercial disasters of 1857 for a time delayed the work, but, in 1858, it was so actively resumed that, in September of that year, a portion of the building was opened. Dr. Burroughs, in accordance with the wishes of the original donor, was elected President. His general learning, high character, and thorough sagacity in the selection of his faculty, and in the management of the finances of the institution, have fully justified the confidence reposed in him by Mr. Douglas, and by the subsequent benefactors of the institution, some of whose contributions have rivaled, or exceeded, that of Mr. Douglas himself in value and beneficial influence. Among these, Mr. J. Young Scammon stands, we believe, pre-eminent, as the founder of the Dearborn Observatory, which is a part of the University.

During the past ten years the University has advanced rapidly, having an average attendance of about three hundred students, and a curricu-



lum of which the State and the Northwest may be proud.

In the Collegiate Department, the President, Rev. John C. Burroughs, D. D., LL. D., occupies the chair of Mental and Moral Philosophy; James R. Boise, Ph. D., LL. D., that of the Greek Language and Literature; J. William Stearnes, M. A., that of the Latin Language and Literature; and the celebrated Truman Henry Safford, B. A., that of Mathematics and Astronomy, who is also director of the Dearborn Observatory. The other departments are in the charge of instructors well qualified for their respective chairs, and favorably known in the scientific and literary world. Confidence can only be inspired in the minds of students by a strong and thorough faculty.

The work of the University is divided into five courses. I. Classical, or Literary Course, under which head are included all the branches of study necessary for the B. A. degree. II. The Scientific Course. III. The Course in Civil Engineering. IV. Course in Astronomy. V. Course in Practical Chemistry.

In the study of the higher mathematics and astronomy, the University of Chicago has a great advantage over most of the institutions on this continent, in that it possesses the largest telescope in America. This instrument is placed in the Dearborn Tower—part of the University building—which, with other necessary instruments, constitutes the Dearborn Observatory.

“The dimensions of the equatorial are:

|                                     |     |        |
|-------------------------------------|-----|--------|
| Diameter of declination circle..... | 30  | inches |
| Diameter of hour circle .....       | 22  | inches |
| Total length of object glass.....   | 23  | feet   |
| Aperture of object glass.....       | 18½ | inches |

The circles are read by two microscopes each—the hour circle to seconds of time, and the declination circle to ten seconds of space. There is also a meridian circle of the first-class, constructed by those eminent artists, Messrs. A. Repsold & Sons, of Hamburg, which has a telescope of six French inches aperture and divide circle of forty inches diameter; otherwise it is similar to Bessel's celebrated Koenigsberg circle, by the same makers, with some late improvements in the illumination of the field and the wires, and apparatus for rejecting declinations.”

#### PREPARATORY DEPARTMENTS.

The Preparatory School connected with the University is held in the University building, over which the several departments of the faculty keep a constant supervision. The course in this Preparatory School extends over a period of three years. Wayland University, at Beaver Dam, Wis., has also become a preparatory school for the University of Chicago, and has passed under the control of its trustees. The students in both of these

preparatory schools pursue a course of study which the University afterwards takes up and continues; the intention being to afford a thorough education in the lower as well as the higher branches. Those who prefer to have their sons educated in the country, whether on account of health or morals, or in the city on account of residence with their parents or friends, or other social advantages, are provided for by these two excellent preparatory schools.

#### LAW DEPARTMENT.

The Law School of the University is almost a separate institution, because of the distance of the University buildings from the Court House and law offices of the city. That the students of law might have the benefit of a practical as well as a theoretical education, the University leased a commodious lecture room in Oriental Building, No. 122 LaSalle street, opposite the Chamber of Commerce. This location, in the heart of the city, in close proximity to the courts, both state and federal, which are constantly in session, has advantages which but few of the law schools of the nation possess. The hours for lectures are arranged to allow the student opportunities of attending court and reading in an office, where he may see applied practically the principles taught in the lectures. Three lectures are given each day, of which two are delivered between 8 and 10 a. m., and the third between 5 and 6 o'clock p. m. This leaves the hours between 10 a. m. and 5 p. m., at the student's disposal, to pass in the library, in the courts, or in some counselor's office.

The Law Department was organized in 1869, by the appointment of a Board of Counselors, composed of the Hons. Thomas Drummond, Mark Skinner, Hugh T. Dickey, George Manniere, Grant Gooderich, Van H. Higgins, Isaac N. Arnold, N. B. Judd, B. S. Morris, H. G. Miller and E. B. McCagg. The board immediately appointed a committee, composed of the Hon. H. T. Dickey, Ezra B. McCagg and Thomas Hoyne, “to secure, as the first step to a permanent organization, a competent and proper person to take charge of the proposed Law School as principal instructor.” The Hon. Thomas Hoyne made a tour eastward, visited established law schools, and consulted with eminent professors in the Eastern colleges, as to the selection of a proper person to take charge of this young Western law school. As the result of these labors, the choice of the committee fell upon the Hon. Henry Booth, of the State and National Law School of New York, who accepted the position and came to Chicago. The Law School was formally opened by an address by the Hon. David Dudley Field, of New

York, on the 21st day of September, 1859, the faculty being composed of the Hon. Henry Booth (now Circuit Judge) and the Hons. John M. Wilson and Grant Gooderich, Judges of the Superior Court, of Chicago. The history of the Law School, to the present time, has proved the excellence of the choice of the committee. The school has proved a great success, and now numbers among its graduates many able lawyers in all parts of the Union, and not a few of rare prominence. The past success of the Law Department is due almost wholly to the unrelaxed devotion of Judge Booth to the interests of this institution. For ten years, while in the active practice of his profession, he has devoted himself to his lectures at the most unselfish sacrifice of his pecuniary interests. Partly as a deserved reward for this devotion to the interests of the profession in the West, Prof. Booth was elected, in July last, to the Circuit bench, and now fills that position as creditably as he formerly did the professor's chair. He still remains dean of the law faculty, and daily lectures to the students, after court, on the more difficult and intricate departments of the law. The present faculty is composed of Judge Booth, dean of the faculty; Van Buren Denslow, Esq., for ten years a practitioner at the bar of New York city, and now one of the leading editors of the *Chicago Tribune*; General R. Biddle Roberts, late of Pittsburgh bar, and for many years a prominent lawyer there; and John Alex. Hunter, Esq., of the Chicago bar, Judge Booth's late business partner. Both General Roberts and Mr. Hunter are in the active practice of their profession in Chicago, and are well known at the Chicago bar as able lawyers. Mr. Denslow is better known at the West as an editor than as a lawyer, having begun his career as a journalist in the position of leading editorial writer of the *Chicago Tribune* in 1863. He resigned from thence to assume the chief editorship of the *Chicago Republican*, in 1865, and from thence withdrew, in 1866, to a position as editor on the *New York Tribune*, where he remained about two years, and at the same time participated in editing *Putnam's Monthly*. He is known to many of the readers of *THE BUREAU* as the writer of some of our most vigorous articles. Having recovered from a catarrhal affection which induced his retirement from the bar to the fascinating field of journalism, and having met with fair and perhaps equal success in both occupations, he finds the duties of a lectureship a partial compensation for the loss which every true lawyer must feel in the surrender of the active practice of his profession.

The Law Department of the University of Chicago, like some of its other departments, needs a

more complete endowment, to relieve the students from the burden of tuition fees. This it undoubtedly will, in time, obtain. Meanwhile, the great advantages of its location, in the vicinity of so many offices of lawyers in heavy practice, and of the Chicago Law Institute's Library, of nearly 20,000 volumes, to which the students may obtain access on payment of a small annual fee, are sure to sustain the Law Department as one of great value to the University, and to the bar of the Northwest.

#### CONTRASTED MARKETS.

Free Traders habitually sneer at the claimed importance of a home market for the American farmer, as if it was the vagary of a distempered mind. It is certain, however, that the foreign demand is limited and inadequate, as well as fluctuating and unsatisfactory, being small when prices are remunerative, and large when they are ruinous to the grain-grower. Official records of our government show that the aggregate value of breadstuffs and provisions exported from the United States during the period 1820-59, embracing almost thirty-eight entire years, amounted to only \$923,373,394, or nearly sixty-nine million dollars less than the value of the corn crops of the two seasons, 1869 and 1870, reckoned at the average rate of fifty cents per bushel. If, then, throughout a period which lacks but little of covering half the time since the formation of the Union, the whole foreign demand for our flour, wheat, corn, oats, rye, barley, mess beef and pork, tallow, lard, butter and cheese, with other produce and provisions, has not equaled in value, by many millions of dollars, the sum total of two of our successive corn crops, what can such a restricted market be worth to our agricultural classes, as an annual reliance for the sale of their surplus products? In 1860, the percentage of exportation to total crop, was, of flour and meal, 5.15; of wheat, 2.40, and of corn, .39. These figures certainly hold out very stinted encouragement to our farmers. They will appear still more insignificant when the vast area embraced by the great isothermal lines of cereal production on this continent shall have been settled and developed. To convey a distincter idea yet of the diminutive quantity of our breadstuffs taken by foreign countries, we may instance the fact that, during three consecutive months of last year, the warehouses for storing grain, in Chicago alone, contained as much wheat, within 600,000 to 800,000 bushels, as satisfied the entire export demand in 1860. When it is considered that this meagre exportation took place under the operations of a tariff reduced to the revenue standard by a free trade party in



power, on pretense that large exactions were made from the pockets of the people, more than were necessary for the wants of the government, and with the avowed intention to force the income from customs down to fifty millions of dollars, we have a practical commentary of no little value on the theoretic excellence of that policy that would, if it could, place our farmers more and more at the mercy of the foreign market.

Not only do other nations consume a small percentage of our breadstuffs, but the demand is vacillating, often passing suddenly from one extreme to the other. Thus, in 1858, Europe took of us to the extent of 6,846,071 bushels of wheat; next year the quantity fell off to 496,864 bushels—a total frequently exceeded by one week's receipts at Chicago. In 1861, the export advanced by a single mighty leap to 29,007,886 bushels. In 1864, the European demand amounted to 16,825,342 bushels; but, in 1865, it dropped, without warning, to 3,102,055 bushels, declining still further, in 1866, to 1,589,321 bushels. Nothing could be more unreliable and unsatisfactory than such a market, and our wheat-growers would be foolish indeed to measure their crops by its estimated wants.

These figures and facts show conclusively that the American farmer must find his regular customers at home. The great bulk of our cereals are now, long have been, and must continue to be, consumed by our own people. An unavoidable corollary is, that if any market is to be fostered, protected and extended by legislation, that one should be the domestic. That alone can give sufficient scope to the consumption of the produce of American industry. Its purchasing power must ever be a true measure of our material prosperity. Were this country suddenly and permanently cut off from all intercourse with foreign nations, as fully as it was before the time of Columbus, it contains population, resources, and civilization enough to work out the most prodigious development; but, were the home market paralyzed, decadence would from that moment mark our progress, involving in the train of its consequences the destruction of our foreign commerce itself. No folly can be greater than that which teaches us to cultivate the foreign in preference to the home market.

#### ORTHOGRAPHIC SURVEYS OF CITIES.

[*Extract from the forthcoming Report of the Sheffield Scientific School.*]

The application of the principles of geodetic and plane-table surveying to the surveys of cities has recently been thoroughly developed by the United States Coast Survey in the survey of the city of Portland, Maine, and in some other instances, and the advantages of the system thus worked out, over the customary but radically defective methods so long in

use in this country, have become so apparent, that the Governing Board of the Sheffield Scientific School are about to take measures to introduce a course of instruction having for its object the training of young men in the practice as well as the theory of this system.

To accomplish this end it will be essential to give students a large amount of practice with the plane-table, combined with the theodolite and level, in the field; and through the kindness of Prof. Peirce, Superintendent of the Coast Survey, advantage will be taken of the presence of the surveying party of Mr. Bache in this vicinity during the coming season, to initiate several of our graduates in the use of the instruments and in the methods employed, in order that they may become instructors to others; so that in a very short time it is hoped that graduates of the school may be fully qualified for conducting city surveys by the more accurate processes which the practice of the Coast Survey has given to the country.

The rapid growth of the cities of this country is a matter of universal observation and comment, and every one who has lived for a long time in one of these growing towns is familiar with the manner of their expansion. It is seldom that the first founders of a small town have sufficient faith or foresight in regard to the future extensions of their municipal jurisdiction to enable them to lay out definite plans for such extensions, except perhaps the mere drawing on paper of what may become the lines of future streets. From time to time new areas are taken into the city limits; the streets already in existence are extended or new ones projected; and new districts, which before had been occupied as farm lands, become thickly populated. Where the land was at one time the property of a single individual and was bought and sold by the acre, and estimated at a certain number of acres, more or less, it becomes divided among hundreds and perhaps thousands of proprietors, and is valued and sold by feet and inches.

Whatever plan may have been adopted for the directions and locations of streets and squares, new questions of the highest importance constantly arise in regard to grades of streets, the locations of sewers, and the provisions for drainage; all, questions not of convenience, merely, to the population, but of vital importance to the health of the inhabitants. One set of men plan one portion of the city: and years afterwards, when they are dead and gone, and their ideas forgotten, another set of men plan another district; the old drains or sewers are found to be too small, or not located to meet the necessities of the new improvements: streets must be again dug up for new sewers, and old grades altered to conform to the new, and possibly the natural lines of drainage for the new localities have been completely blocked up by foundation walls of buildings; and there is no resource but to allow the water that falls upon the surface to remain stagnant in a water-soaked stratum beneath the surface. There having been no unity of design in anticipation of so great an expansion, the evils which follow, however great they may be as regards health and comfort, must often be suffered to exist on account of the great expense which would attend any reasonable attempt to remedy them.

But these evils, defective drainage and its fearful consequences, the alteration of grades, and the necessity for building enlarged sewers, involving perpetual assessments, are not the only evils which are entailed on successive generations. Few people are aware of the fact that the processes by which streets are laid out and the land ultimately divided up among its thousands of owners are radically defective. We do not refer to surveys by the magnetic compass: that instrument has long since been banished from the list of surveying instruments, where any attempt at accuracy is made; but to the approved processes which are employed by the best city surveyors at the present day

The defects do not lie in the instruments which are employed, the theodolite, transit, spirit-level, and chain or steel-tape line; nor in a want of skill in the surveyors; but in the system which is followed in making use of these valuable instruments. The transit is an instrument designed to enable a surveyor "to run a straight line," to use a well understood form of expression; that is to say, to enable a surveyor to trace out a line on the surface of the earth which shall lie in one vertical plane; or to trace the line in which a vertical plane intersects the earth's surface. For this purpose it is the best and perhaps the only reliable instrument. The spirit-level is employed to determine the relative altitudes of the points of such a line, or of any two or more points above a fixed plane or point which is chosen as a reference. But neither of these instruments furnishes the means or facilities for measuring horizontal distances; and the relative horizontal positions of lines and points must be determined by some other process. Here lie the defects of the present system. The very measurements which, of all others, are to constitute the map, and by which the relative positions of lines and points estimated in horizontal directions are to be determined, the measurements and distances which are to determine proprietary lines, where the ground may be valued at hundreds of dollars per square foot, are left to the deceptive and false determinations which result from chain or tape-line measurements along undulating surfaces. The true idea of a map of a city is that it is a projection upon a horizontal plane of the boundaries and division lines of the site. But no city map fulfills this condition that is constructed by the methods of surveying at present in use. No means are taken to reduce the measurements to horizontal projections, except perhaps in rare instances where the declivities are very great, and even in such cases the partial and inaccurate reductions only add to the general confusion. It has been supposed doubtless that the errors arising from the tape-line or chain measurements along undulating surfaces are unimportant; and yet there is probably not a city survey in this land in which continued adjustments of property lines have not been found necessary. One city surveyor lays out property on streets which are not graded, and his successor in attempting to reproduce the former dimensions and distances after the grades have been established and the embankments and fillings executed, finds that these dimensions and measurements will not fit the ground, and with denunciations of the errors of his predecessors, he proceeds to make adjustments. The owner of a house finds that his wall stands several inches upon his neighbor's ground, or that he does not own "down to the center of the earth and up to the sky" of quite as much area as he thought he did, and litigation is resorted to, to settle the difficulty.

The true cause of all these difficulties may be easily explained. Let us suppose that the site of a town or city projected upon a horizontal plane is a true square, but that the surface of the ground is undulating. To begin with the exterior boundaries: these are usually run from one fixed landmark to another; in the case under consideration these landmarks may be the four corners of the square.

The surveyor proceeds to run straight lines with his transit and to measure the lengths of the sides with his chain. The ground being undulating the lengths measured along the surface are greater than their true horizontal projections, and the four sides, as measured, will all be greater than the true boundaries, and all different from the others; and the map drawn from such a survey will not appear as a square, as it should, but as an irregular polygon of four sides. So with lines running across the site; wherever a measurement is made upon an inclined surface, that measurement will be too great, if used without correction, and the result will be a general and irregular distortion. Lines which are first laid out on paper and then transferred to the ground will show

gorges and overlappings, attributable to unavoidable errors of the survey; and the remedy adopted is to make the best adjustment possible under the circumstances. Succeeding surveyors find no base lines or standard distances to measure from, because every change in the surface produces changes in the measurements between established points.

Since the true theory of a city map is, and should be, that it is a horizontal projection of the lines of streets and of division and boundary lines, it is evident that such a map, if enlarged to the scale of the natural lines of the city and spread over the city, should be so accurate that each line and point of the map would fall upon its original in nature. Such a map it is impossible to make by the present methods, whatever may be the skill of the surveyor or the perfection of the instruments; and the errors introduced by these methods have been the fruitful source of litigations, heavy expenditures in the alteration of lines of streets and buildings, and of general uncertainty and inconvenience.

The true remedy for all the difficulties of drainage, sewerage-grades, the want of fixed lines of division, and of correct boundaries, may be found in the use of the PLANE-TABLE.

This instrument has long been known, and is described briefly in all good works on surveying; but though simple in its design, there is no instrument which requires so much practice in its use in order to bring out and employ its valuable qualities.

To survey a city with this instrument a single line is first measured by an apparatus which gives the true horizontal length of the line with great precision. With this line as a basis a series of triangles is established covering the whole site, the angles of the triangulation being measured with the theodolite and the length of the lines calculated trigonometrically. There are thus established a number of fixed points, the distances of which from each other depend in no measure upon the configuration of the surface, but these points are the true horizontal projections of such points on a plane of reference, which plane is represented by the map. The plane-table is then employed to continue this triangulation by dividing up the large triangles, even to the most minute distances; every topographical feature of the site being determined by the intersection of geometrical lines upon a horizontal plane: division lines, the lines of buildings, lines of streets, and all other features, are thus determined, and the connecting lines between them drawn in on the ground; so that the map of the city is made not in the office, but in the field, and presents, when completed, not the distorted results of surface measurements, but the true projections of the lines and points of the surface without regard to elevations and depressions.

In connection with this system of geometrical and orthographic surveying the spirit-level is employed in combination with the plane-table to determine the altitudes of all points of the site. For this purpose the lines of intersection of horizontal planes, three and six feet apart, are marked out on the ground by the level, and the curves thus formed are transferred to the map by the plane-table; so that the completed map presents not only the true horizontal projections of the lines of the city, but also the horizontal projections of a system of curved lines which pass through all points at altitudes of three, six, nine and twelve feet respectively above the plane of reference. The map thus constructed is a miniature representation of the surface delineated, not only in horizontal, but in its vertical features.

With such a map as a basis, all the important problems of city engineering become easy of solution. The lines of natural drainage and the planes of the water-sheds become apparent on a simple inspection; and thus the course as well as the magnitude of the drains and sewers may be indicated with unerring certainty. The establishment of the grades of the main avenues and cross streets may be adjusted in such



a manner as to avoid unnecessary expense in cutting and filling; and with reference also to the all-important system of drains and sewers.

The study of such a map will enable an engineer to point out those areas which should not be built upon until they are raised by filling to the proper level; and private improvements are thus rendered secure from subsequent changes or alterations.

The first essential element to successful city engineering thus lies in a thorough orthographic survey, without which all engineering operations must, to a greater or less extent, be imperfect in design, because they are not based upon the true topographic features of the site to which they are applied.

Among all the great benefits which the United States Coast Survey has conferred on this country, the development of this true system of city surveying is among the most important. Every city in the land should avail itself of this method at the earliest possible moment, in order to avoid the perpetual propagation of the evils and defects of the existing surveys. In the case of the city of Portland, as it will be for all the Atlantic coast cities, the primary and secondary work of triangulation of the coast already made by the Coast Survey furnishes a ready basis for city maps by the plane-table. For cities thus situated, the revision of their maps will be comparatively simple and inexpensive.

The only difficulty that still presents itself is a deficiency of men who are expert in the use of the plane-table, which is still a new instrument to general practice. To supply this want as far as practicable, the Sheffield Scientific School of Yale College contemplate establishing the course of instruction to which reference has been made.

#### ARTIFICIAL STONE—THE SOREL PROCESS.

There is no field of invention, says the *Scientific American*, which to-day is more replete with general scientific and practical interest than that pertaining to the manufacture of artificial stone. While, in the working of iron, men have sought out means whereby it can be rapidly and cheaply converted into the forms required, the world has to the present day been content with working stone after the same general method used in the construction of the pyramids. The rudest of all materials is thus changed by immense labor into costly forms; and the attempts to obviate the necessity for this labor and expense have been confined to a very recent period.

The idea that stone could be cheaply produced by artificial means, and molded to any form required, has gradually forced itself upon the minds of modern inventors, and has borne fruit in a large number of processes more or less practical and adapted to secure the end in view.

Very many of these processes have, however, failed to secure such results as to warrant their general adoption. Some require the steeping of the stones in some solution after they are molded, to remove or transform some contained material, or to add something which could not be advantageously added in earlier stages of the process. Among these is the celebrated Ransome process, which has not given uniformly satisfactory results.

Other sorts of artificial stones are sand concretes made with cements of various degrees of hydraulicity, and many of them of such inferior quality as to render them utterly unreliable for use as building material.

The process invented by M. Sorel, the celebrated French chemist, produces results which we have never seen equaled by any other. It has for its basis the use of oxychloride of magnesium, a new cement discovered by M. Sorel, who was also the discoverer of oxychloride of zinc. The process has been patented in this country, and the patent is owned by

the Union Stone Co., of Boston, Mass., who apply it to the manufacture of all kinds of stone molded in ornamental forms for building purposes. They also apply it to the manufacture of emery wheels, needle sharpeners, oil and water stones, soap-stone register rings, and faces for sad irons, etc. In short, they work any kind of stone by this process, first disintegrating it by suitable mills and molding it again into any form wished, and by the use of the cement named consolidating the mass to even greater strength than it originally possessed, without alteration of color or apparent texture.

We have now before us specimens of marble, sandstone, blue-stone, etc., which look exactly like the original stone, yet which are even more dense and hard than the stone from which they are made. The marble, which is a beautiful specimen, having a fine crystalline fracture, was made of common marble-yard refuse. In fact, there is no sort of mineral solid material which the magnesium cement does not seem capable of uniting, and holding with great tenacity. The process of making stones by this method is as follows: Natural magnesite—carbonate of magnesia—is first calcined, which reduces it to the oxide of magnesium. In this state it is mixed dry in the proper proportion, by weight, with the powdered marble, quartz, sand, or whatever material forms the basis of the stone. It is then wetted with bittern water, which converts the oxide of magnesium into the oxychloride. The now semi-plastic mixture is rammed into molds, where it speedily hardens, sufficiently to be taken out and laid on skids. In two hours' time the stone is so hard that the heaviest rain will not wash the corners off, and in from a week to two weeks the stones may be marketed and used.

These stones are, according to good authority, capable of withstanding even more severe weather tests than natural stones. Tests made in Boston as to their strength are certified to have given better results than natural stone; and certainly the specimens we have indicate that they are in no way inferior to the natural stones they severally represent.

The hydraulicity of magnesium salts has attracted the attention of several of the most eminent chemists in the world.

In a note recently read before the Academy of Sciences, in Paris, by M. Deville, he called attention to the action of water upon magnesia. A portion of a specimen of magnesia, prepared by calcining the chloride sent him several years previously by M. Denny, was kept constantly exposed to water under the taps of his laboratory. After a time it assumed a remarkable consistence. It could scratch marble, and, though subjected to atmospheric action for six years, it underwent no perceptible change.

The substance proved to be a crystallized hydrate. Subsequently, with magnesia prepared from the hydrate, he obtained similar results, and casts of medals after having been placed in water assumed the appearance of marble.

Magnesia obtained by calcination of the chloride prepared by treatment of sea-water, though its hydraulicity is partially destroyed by calcining at a white heat, exhibits remarkable hydraulic qualities when brought to a red heat. Equal parts of chalk or marble and magnesia formed into a plastic mass becomes hydrated and extremely hard when acted upon by water. A paste made from dolomite, calcined below a red heat and powdered, forms, under water, a stone of extraordinary hardness.

The experiments of M. Deville show that to the hydraulicity of magnesia is due the union of the particles of chalk or marble in forming a compact, homogeneous stone, and numerous obvious applications of this property of magnesia in the arts will readily suggest themselves.

M. Fremy, in his published researches on hydraulic cements, attributes the setting of hydraulic lime, first, to the hydration of the aluminate of lime, and, second, to the reac-

tion of the hydrate of lime upon the silicate of lime, and the silicates of alumina and lime.

It is evident from these observations that the oxychloride of magnesium is a cement of great power and durability, and that as an hydraulic cement it ranks among the best known to modern science. Its application to artificial stone manufacture, we think, solves the problem of how to make such stones of proper density, durability, strength, and capability of taking a high polish. If we may credit the statements in regard to cost of manufacture, there seems no reason why stones of this kind should not be able to more than compete with cut stones of any variety and for any purpose.

## AGRICULTURAL MACHINERY.

### THRESHING MACHINES.

In accordance with our promise in last issue, we propose to furnish our readers with some idea of the leading points in controversy between the two principles of threshing or, rather, separating grain.

The principle of threshing in all machines is so nearly alike and effective as to preclude the necessity of any further remark. The separating power is the great point of excellence to be maintained. As stated in our issue of May, we select for illustration the Original Pitts and the Aultman & Taylor threshers, inviting particular attention to the mechanical construction of both; first in the order of its coming will be

#### THE ORIGINAL PITTS.

The grain is thoroughly threshed and beaten out of the heads, in its contact with the cylinder, which forces or drives it down and forwards. The bulk of the grain, estimated at seven-eighths of the whole, is stopped at the cylinder by reason of the guard-slats placed there to protect the apron and the openings through the concaves. This portion of the grain parts contact with the straw at the cylinder and falls through the open concaves and guard-slats directly into the troughs or cells of the apron. The remainder of the grain, mixed through the straw, passes up together on the apron, which is being agitated by a sharp jerking motion over the friction pulleys on which it rests, till it comes in contact with the beater, "armed with teeth" and revolving with great rapidity, which passing through the mass of straw, tears the knots and lumps to pieces and causes the greater portion of the eighth remaining therein to fall through into the cells of the apron, where it is seized hold of by the swift-revolving picker, and the particles of straw are here pulled apart most effectually, and spread out thinly on the slat-belt or rake, and whilst passing over it, is again thoroughly agitated by a vibrating arm or rocker, which motion fully dislodges the last particle of grain heretofore adhering to or mixed with the straw.

Thus we see that the process of separation is constantly taking place from the moment the sheaves are fed into the cylinder until the clean grain is delivered into the usually attending half-bushel. First, at the cylinder, when from three-fourths to seven-eighths of the grain falls through the concaves and guard-slats into the apron; the remaining moiety of grain mixed through the straw, is got out of it at the beater, the picker, and in the passage over the straw-rake.

Now for the modern reformer, with all the amendments:

#### VIBRATOR, OR AULTMAN & TAYLOR.

The separating portion of this machine is made in the form of a long box, decked over at the top, open at the rear end and divided horizontally into three portions or sections.

The upper portion or section is stationary. Below this are two movable sections or troughs, each about six inches deep, fitting into each other. The middle section has a bottom formed of transverse wooden slats, with spaces between them to permit the grain to fall through.

Just above this open slat work are placed several sets of

finger-bars with long projecting fingers in each. These fingers reach from one bar to the other, nearly the entire length of the separator. To one end of each finger-bar is attached an upright arm. The upper ends of these arms are connected with the stationary frame of the machine by means of leather straps, which are regulated by thumb-screws. The lower section has a tight floor to hold the grain after it is separated from the straw, and falls through the slatted floor of the upper one. It also projects under the concave, which is grated, so as to receive the threshed grain that goes through the concave and grate. It also projects partly over the sieves, and is perforated at this end, so that the grain falls through these perforations or holes, and is evenly distributed on the sieve. The lower and middle sections are both suspended on swing rods, so as to swing freely, and are made to "vibrate" or swing backward and forward by means of the crank-shaft and connecting-bars. The two sections move in opposite directions, one going forward while the other goes backward, and thus "counterbalance" each other, so that the machine stands still without blocking or bracing, and there is no perceptible strain on the frame.

The operation is as follows: The machine being in motion, the two sections are vibrated backward and forward and communicate an eccentric motion to the fingers, which works the straw gradually to the rear. As soon as the straw leaves the threshing cylinder, it is deflected at once to the agitating fingers by the circular deck or deflecting curve. The first rank of fingers toss the straw up with a few smart rapid blows, and it passes to the next, and so on, over the successive ranks of agitating fingers, each rank contributing to the *thorough and continual shaking, until the straw passes from the machine.* Meantime, whatever grain goes through the concave and grating under the threshing cylinder falls into the lower section. The grain remaining intermingled with the straw is thoroughly shaken out in its passage over the agitating fingers, and sifts through the open slat work into the lower section and is conveyed to the fan mill. The upper section is large and roomy, affording ample space for the tossing process. The "throw" of the fingers can be INCREASED OR DIMINISHED (*even while the machine is running*) so as to give the straw ANY NECESSARY AMOUNT OF SHAKING, thus insuring agitation in all kinds and conditions of grain.

Thus, so far I have given in full the claims made by both parties, and know that the Aultman & Taylor has made a good solid success, and that it is no longer an experiment. Whilst so doing I also wish it to be understood that I consider that the Original Pitts, as manufactured by H. Pitts' Sons, has not suffered in its well-established reputation by the progress of the Aultman & Taylor. The Pitts principle has always been right. Its application by careless and egotistical manufacturers has been the only wrong it has met with since 1837, the year of its nativity.

The coming season will find them in the lists contending for the championship in the correct principle of separating. I wish all parties a clear field and no favor. J. N.

## Correspondence.

[Special Correspondence of THE BUREAU.]

### AKRON, OHIO.

AKRON, O., May 12, 1871.

In common with the other towns of this region, Akron is enjoying a breathing-spell, is resting somewhat, before moving on in gigantic strides of progress and improvements. It is by no means dull in this active little city among the hills. The streets are filled with bustling, busy people, and only a citizen can observe that there is a slight degree of falling-off in the intensity which has characterized the place during the years wherein it has grown so rapidly. Soon, too, all the



wonted activity will be resumed, and with the greater energy by reason of this brief rest. Another era of growth is opening before the place, and the city's interests fortunately are in the care of men shrewd enough to see the future before it, and to mold it to the town's advancement.

At this writing, every manufacturing establishment in the city is in full operation, except the Akron Steam Forge. That is being overhauled, and will be put to work as soon as possible by its recent purchasers, Col. George T. Perkins and Messrs. John McGregor and B. Grosvenor. Messrs. Goodrich, Tew & Co. have begun to make hose, car-springs, belting, etc., at their new establishment, of which THE BUREAU has already spoken, and which is the pioneer India-rubber factory west of New Jersey. The building for the Buchtel College of the Universalist denomination of Ohio is in course of erection, and the corner-stone will be laid July 4th, with great Masonic ceremonies by the Grand Master of Ohio and the Masons and other fraternities of this city and neighborhood, under the auspices of the denomination interested. Horace Greeley, Gov. Perham, and ex-Gov. Washburne, of Maine, among others, are expected. The building will cost not less than \$100,000, and will be complete as well as large. The newly-formed Lutheran (English) society have begun to build a church edifice, to cost between \$40,000 and \$50,000, and expect to lay the corner-stone, with suitable ceremonies, on Whitsunday, May 28. In addition to these greater improvements, a good amount of building is in progress, and some fine business blocks and handsome residences will result from this season's work.

However, the city itself at present is the most active in good works, and is making improvements with unabated zeal. According to the present plans, about fifteen miles of streets will be graded during the present season, including Exchange and South Main, two of the longest and most important thoroughfares. In addition, a system of sewerage for the entire city is to be designed. This will be in connection with the several main-sewers already built, and some important parts of the system will be built this season. The most important improvement, however, is the West Market street bridge over the Ohio Canal. Considering the relative size of the cities and the interests to be served, this is a greater undertaking than the "high level bridge" Cleveland began to talk about over a year ago, but has not yet begun. Akron wasted no time in talk, but went to work at once. The bridge is being built of the Peninsula or Cleveland sandstone. The arch will have a span of 56 feet, with a height of 22 feet 4 inches above the water. The arch is a five-center arch, with 15 feet 9 inches as the shortest radius, 24 feet 7 inches as the second, and 37 feet 5 inches as the third, and with a distance of 21 feet from the springing-line to the crown. The abutments, of solid masonry, are each 13 feet thick at the base, and have an extreme height of 39 feet. The bridge will be 58 feet in width, and will have a 36-foot roadway and two 11-foot sidewalks. The center supports of the arch while building will be on the Howe-truss plan, and each of the twenty bents to be used will be heavier and stronger than the old bridge. The canal and street are so situated with reference to each other that this is probably the most difficult point along the entire canal whereat to construct a bridge. The difficulty has been overcome to the satisfaction of both interests. The contract price for the bridge alone is \$21,300, but that is only the beginning; for the bridge floor will be nine feet higher than before, raising the grade that much, and necessitating the filling-up of the street to a remarkable degree. Another most important improvement is the extension of Howard street to the city limits. The outer end of the street is being cut through the Chuckery Hill. The cut is 750 feet in extreme length, 30 feet wide on the bottom and 120 feet on the top, is 60 feet in extreme depth,

and involves 50,000 yards of cutting. Mr. J. D. Alderfer, the contractor, is about to set a steam excavator at work. Mr. Alderfer has himself devised a portable railway, with proper cars, that has a small first cost, and does the work of many carts and horses, with a saving of time and labor.

Taken altogether this is a noticeable amount of public improvements for a town of this size to undertake in a single year. The reason for it and the ability to do it are given in one word—manufacturing. Diversified industry has made Akron prosper. While its attention was confined to merchandising and grinding wheat, the town simply held its own. When it began to work iron and wood into agricultural implements it soon became a city, and its growth since has been very rapid, and sound, as well. This city's success is a constant protest against free trade.

While recognizing the importance of these improvements, it will not do to neglect the gentleman in charge of them. City Civil Engineer P. H. Dudley is making an enviable professional record here. Modest and unassuming, always at work zealously, yet quietly, he is such an efficient officer as is rarely met with in our public service, whether municipal or  
T. C. R.

### CARVED FRAMES OF FLORENCE.

The *Art Journal* says: A visit to the branch establishment of a famous maker of carved frames at Florence has resulted in so much satisfaction that we strongly recommend it to our readers. In few art matters has there been so marked a decadence in latter times; the old designers of frames for pictures and mirrors were artists; they studied how best to combine elegance with durability; and many of their productions have descended to us works to be valued almost at the worth of the paintings they inclose. If we examine any modern collection of pictures, we shall find nearly all the frames have a common type; stucco, papier mache, "composition," give to them a family resemblance that deteriorates rather than embellishes the work of the painter. No doubt the carved frame must be costly; it is solely "handiwork," and must be paid for accordingly. There are few who, in England, can design and execute such objects at all; and these few produce them at prices that place them beyond the reach of persons not rich. It is a grand boon to supply us with carved, in lieu of composition, frames; the latter are easily injured, soon tarnish, and seldom convey an idea of art. It is, therefore, with much pleasure we note a flourishing revival of the old adaptation of wood carving to picture frames at Florence, a revival of so high a nature, too, as to reflect honor upon that ancient and noble seat of the fine arts.

The wood used is the white pine. The specimens we have inspected are remarkably beautiful. They are principally foliage and floral designs, treated with extreme truthfulness to nature, but, at the same time, with masterly freedom. The absence of hackneyed conventionalism in the treatment displayed of acanthus, ivy, or oak, is singularly striking. The designs in fruits and grotesques are equally varied and admirable. These frames are made large enough to inclose a large picture, and sufficiently small to clasp an ordinary carte-de-visite.

## Market Review.

## BOOTS AND SHOES.

LEATHER, HIDES, AND RUBBER  
GOODS.

## CHICAGO MANUFACTURE—

|  | per doz. |
|--|----------|
| Men's French calf pegged boots .....   | \$78 00  |
| Men's domestic calf pegged boots ..... | 72 00    |
| French kip boots .....                 | 75 00    |
| Veal kip boots .....                   | 60 00    |
| Heavy or stoga kip .....               | 54 00    |
| Grain stoga .....                      | 54 00    |
| Boys' fine kip .....                   | 42 00    |
| Boys' stoga kip .....                  | 39 00    |
| Youths' stoga kip .....                | 32 00    |

|                                       |        |
|---------------------------------------|--------|
| Women's buff balmorals ..             | \$2 12 |
| "    goat ..                          | 2 50   |
| "    calf ..                          | 2 50   |
| Misses' ..                            | 1 90   |
| Misses' buff ..                       | 1 65   |
| Children's buff and calf balmorals .. | 1 25   |
| Men's kip plow shoes ..               | 2 50   |
| "    kip balmorals ..                 | 2 50   |
| "    kip balmorals ..                 | 2 25   |

## EASTERN MANUFACTURE—

|                                       | per doz.      |
|---------------------------------------|---------------|
| Men's thick boots .....               | \$39 00@45 00 |
| "    pegged calf boots ..             | 48 00@54 00   |
| "    kip boots ..                     | 48 00@54 00   |
| "    custom kip boots ..              | 50 00         |
| "    grain boots ..                   | 54 00         |
| "    split boots ..                   | 36 00         |
| "    wax brogans ..                   | 1 50@1 90     |
| "    split brogans ..                 | 1 25@—        |
| "    kip plow shoes ..                | 1 75@2 00     |
| "    kip balmoral shoes ..            | 2 00@2 25     |
| "    buff balmoral shoes ..           | 1 75@2 25     |
| "    buff Oxford shoes ..             | 1 50@1 75     |
| "    calf Oxford shoes ..             | 2 00@3 50     |
| Boys' thick boots ..                  | 30@—          |
| "    kip boots ..                     | 36@—          |
| Youths' kip boots ..                  | 24@30         |
| "    thick boots ..                   | 22@26         |
| Women's buff balmorals ..             | 1 50@2 00     |
| "    calf balmorals ..                | 2 00@2 50     |
| "    goat balmorals ..                | 2 00@2 50     |
| Children's buff and calf balmorals .. | 90@1 25       |
| Ladies' lasting congress gaiters ..   | 1 50@3 00     |
| Ladies' lasting balmorals ..          | 1 75@3 00     |
| Ladies' goat and kid balmorals ..     | 2 00@4 50     |
| Ladies' glove-kid union balmorals ..  | 3 00@4 50     |
| Men's rubber overshoes ..             | 1 10          |
| Women's rubber overshoes ..           | 80            |
| Men's Arctic overshoes ..             | 2 60          |
| Women's overshoes ..                  | 2 00          |

## LEATHER.

| OAK—                         |             |
|------------------------------|-------------|
| Baltimore sole .....         | 46@ 48      |
| Philadelphia sole .....      | 52@ 54      |
| Slaughter sole, heavy .....  | 45@ 47      |
| Slaughter sole, light .....  | 48@ 49      |
| Harness .....                | 45@ 50      |
| Upper .....                  | 30@ 33      |
| Kip .....                    | 90@ 1 25    |
| Calf .....                   | 1 60@ 1 70  |
| French kip .....             | 1 35@ 1 60  |
| "    calf, heavy .....       | 1 80@ 2 15  |
| "    medium .....            | 2 00@ 2 35  |
| "    Lemoines, per doz. .... | 80 00@90 00 |
| "    Hubert, pr. doz ..      | 75 00@85 00 |
| "    Jodet ..                | 75 00@85 00 |
| "    seconds .....           | 1 75@2 10   |

## MOROCCO AND LINING—

|                          |       |
|--------------------------|-------|
| Tampico Morocco, XXXX .. | 42 00 |
| "    XXX ..              | 38 00 |
| "    XX ..               | 35 00 |

|                                  |               |
|----------------------------------|---------------|
| Curacao .....                    | \$26 00@32 00 |
| Roans .....                      | 10 00@12 00   |
| Pink linings .....               | 6 00@10 00    |
| Russet linings, X ..             | 7 00@—        |
| "    No. 1 ..                    | —@ 6 00       |
| "    No. 2 ..                    | 4 00@ 5 00    |
| HEMLOCK—                         |               |
| Harness, union .....             | 42@ 45        |
| Harness, city .....              | 42@—          |
| Harness, country .....           | 40@—          |
| Line .....                       | 44@ 46        |
| Upper, city .....                | 32@ 33        |
| Upper, country .....             | 28@ 30        |
| Kip .....                        | 80@ 1 20      |
| Calf, city .....                 | 1 40@ 1 50    |
| Calf, country .....              | 1 20@ 1 35    |
| Collar .....                     | 26@—          |
| Slaughter, sole, Buffalo best .. | 36@—          |
| "    good ..                     | 34@—          |
| Chicago, No. 1 ..                | 35@—          |
| Buenos Ayres ..                  | 32@ 34        |
| Orinoco ..                       | 26@ 28        |
| Damaged ..                       | 28@ 30        |
| Slaughter, upper, in rough ..    | 35@ 37        |

## DRUGS, PAINTS, OILS, ETC.

## DRUGS, ACIDS—

|                              |               |
|------------------------------|---------------|
| Acetic, No. 8 ..             | 18 @ 20       |
| Citric ..                    | \$1 05 @1 10  |
| Nitric ..                    | 18 @ 20       |
| Sulph. carboy ..             | 3 3/4         |
| Less quantity ..             | 6             |
| Tartaric ..                  | 80 @ 85       |
| Muriatic ..                  | 6 1/2 @ 9     |
| Oxalic ..                    | 32 @ 35       |
| Alum, per lb. ..             | 5 @ 6         |
| Ammonia aqua ..              | 10 @ 15       |
| "    spirits ..              | 50 @—         |
| "    carb ..                 | 28 @ 30       |
| Annatto ..                   | 80 @1 50      |
| Arsenic ..                   | 8 @ 10        |
| Arrow Root, Ber ..           | 65 @ 70       |
| Assafoetida, sel. ..         | 45 @ 50       |
| Aloes, Cape ..               | 12 @ 15       |
| "    Socotrine ..            | 90 @1 00      |
| Antimony ..                  | 8 @ 10        |
| Asphaltum ..                 | 10 @ 10       |
| Balsam Copaiva ..            | 1 05 @1 10    |
| Balsam Tolu ..               | 1 25          |
| Bark, Eln, sel'd ..          | 18            |
| "    powdered ..             | 20            |
| Bark, Peruvian Red, p'd ..   | 2 00          |
| "    Yellow ..               | 50            |
| "    Sassafras ..            | 12 @ 14       |
| Bay Rum, pure ..             | 4 75 @5 50    |
| Borax, refined ..            | 35            |
| Brimstone, roll. ..          | 4 1/2 @ 5 1/2 |
| Bi-Carb. Soda, New-castle .. | 6 1/2 @ 8     |
| Bi-Chro. Potash ..           | 22 @ 24       |
| Bleaching Powder ..          | 5 @ 7         |
| Cayenne, pure Af ..          | 42            |
| Cardamo's Mal ..             | 3 75 @4 00    |
| Carb. Magnesia ..            | 35 @ 50       |
| Calcedine do., Eng ..        | 1 15 @1 50    |
| Cubebs ..                    | 35 @ 40       |
| Calomel, Am ..               | 1 25          |
| "    bottles ..              | 1 35          |
| "    Eng ..                  | 1 35          |
| Camphor Gum ..               | 82 @ 85       |
| Canary Seed, bush, 5.50 ..   | 10 @ 12       |
| Castor Oil, Am ..            | 1 90          |
| "    E. In ..                | 2 50          |
| Chloroform ..                | 1 40          |
| Cantharides ..               | 2 10          |
| Cham. Flowers, Eng ..        | 38            |
| "    new ..                  | 40            |
| "    Ger ..                  | 40            |
| Cochineal, Honduras ..       | 1 00          |
| Cochineal, Mexican ..        | 90            |
| Cream Tartar ..              | 48 @ 50       |
| Epsom Salts ..               | 5 @ 6         |
| Flowers Benzoin ..           | 7 1/2 @ 8     |
| Gambia ..                    | 44            |
| Gum Sheilac, native ..       | 1 00          |
| Ginseng ..                   | 1 00          |

|   |               |
|---|---------------|
| Gum Arabic, No. 1 ..  | \$ 85 @ 90    |
| "    No. 2 ..   | 75 @ 80       |
| "    No. 3 ..   | 65 @ 70       |
| "    sorts ..   | 40            |
| Gum Myrrh ..  | 65            |
| Gum Trag. Flak'l ..   | 1 25          |
| "    sorts ..   | 45            |
| Hyd. Pot., French ..  | 4 25          |
| Iodine, resub'l'd ..  | 5 50 @6 00    |
| Isinglass, Am ..  | 2 00          |
| Ipecac, powder ..   | 2 50          |
| Jalap, powdered ..  | 1 50          |
| Kreosote ..   | 1 25          |
| Liquorice, ex ..  | 45 @ 55       |
| Morphine ..   | 6 25          |
| Madder ..   | 22            |
| Man', fl'ke, large ..   | —             |
| Man', fl'ke, small ..   | 1 35 @1 40    |
| Nitrate Silver ..   | 1 10          |
| Nutgalls ..   | 35            |
| Oil Bergamot (Sander-son's) ..  | 5 50 @6 00    |
| Oil Cassia ..   | 3 50          |
| Oil Cedar ..  | 50            |
| Oil Cloves ..   | 2 25 @2 50    |
| Oil Lemon (Sanderson's) ..  | 4 75 @5 00    |
| Oil Organum ..  | 65 @1 75      |
| Oil Olive, pure ..  | 1 85 @2 25    |
| Oil Sassafras ..  | 1 10          |
| Oil Wintergreen ..  | 6 00          |
| Oil Peppermint ..   | 3 75          |
| Opium, Turkey ..  | 6 75 @7 00    |
| "    powdered ..  | 9 75          |
| Potash, Chlorate ..   | 55 @ 60       |
| Phosphorus ..   | 1 10          |
| Quicksilver ..  | 1 15          |
| Quinine, Sulph ..   | 2 45          |
| Red Precipitate ..  | 1 45          |
| Rhubarb, E. In ..   | 1 50 @2 00    |
| Sai Soda ..   | 3 1/2 @ 4 1/2 |
| Senna Alex ..   | 25            |
| Spirits Nitre ..  | 40 @ 45       |
| Sugar Lead ..   | 30 @ 35       |
| Saltpetre ..  | 12 @ 20       |
| Sarsaparilla, Hon ..  | 45 @ 50       |
| Shellac, Camp ..  | 50            |
| Soda Caustic ..   | 6 1/2 @ 7     |
| Soda Ash ..   | 4 1/2 @ 7     |
| Tannin, per oz ..   | 25            |
| Turpentine, Ven ..  | 30            |
| Verdigris ..  | 25            |
| Vitriol, blue ..  | 11 @ 12       |
| LIQUORICE—  |               |
| Pure powdered Root (currency) ..  | 18 @ 20       |
| Common powder'd Root (currency) ..  | — @ —         |
| Sicily Liquorice ..   | 22            |
| Calabria Liquorice, pure ..   | 45            |
| Calabria Liquorice, im'n ..   | 30            |
| DYE-WOODS—  |               |
| Barwood ..  | 5             |
| Brazil-wood ..  | 16            |
| Cam-wood ..   | 10            |
| "    pure ..  | 12            |
| Fustic, Cuba ..   | 3             |
| Hypar Nic ..  | 8             |
| Hachewood ..  | 6             |
| Logwood ..  | 3             |
| Niewood ..  | 3             |
| Peachwood ..  | 5             |
| Redwood ..  | 6             |
| Sapan-wood ..   | 7             |
| INDIGO—   |               |
| Bengal ..   | 3 00          |
| Guatemala ..  | 2 00          |
| Madras ..   | 1 65          |
| Manila ..   | 1 25          |
| OILS—   |               |
| In Linsseed and Lard Oils special rates are made at factory for round lots. |               |
| Linsseed, raw, per gal. ..  | \$1 00 @1 03  |
| "    boiled ..  | 1 05 @1 08    |
| Towers' Boiled Oil ..   | —             |
| Whale, W. B ..  | 88 @ 90       |
| Bank Oil ..   | 65 @ 75       |
| Straits ..  | 70 @ 80       |
| Sperm, W. B ..  | 2 00 @2 25    |
| Seal, pale ..   | —             |



|  |            |
|--|------------|
| Carbon—110 test.....                             | \$ 26 @ 27 |
| “ “ by car load.....                             | —          |
| Deodorized Benzine.....                          | 18         |
| Common Benzine.....                              | —          |
| Lard Oil, extra.....                             | 88 @ 90    |
| “ No. 1.....                                     | 88 @ 90    |
| “ No. 2.....                                     | 85         |
| Red Oil.....                                     | —          |
| Palm Oil.....                                    | —          |
| West Virginia Lubric'g.....                      | 40 @ 50    |
| West Virginia Lubricat-<br>ing, by car load..... | —          |
| Neatsfoot Oil, No. 1.....                        | 1 20       |
| “ No. 2.....                                     | 1 00       |
| “ Pure.....                                      | 1 20       |
| <b>PAINTS—</b>                                   |            |
| White Lead, strictly pure.....                   | —          |
| “ fancy brands.....                              | 9 @ 12     |
| White Zinc, pure French.....                     | 15         |
| “ pure Amer'n.....                               | 12         |
| “ fancy brands.....                              | 11         |
| Red Lead, pure Amer'n.....                       | 13         |
| “ pure English.....                              | 5          |
| Putty, in bladders.....                          | 4          |
| “ in bulk.....                                   | —          |
| French Ochre.....                                | —          |
| Chrome Yellow.....                               | 16 @ 35    |
| Venetian Red, Amer'n.....                        | —          |
| “ English.....                                   | 3½         |
| Vermilion, American.....                         | 25½        |
| “ English.....                                   | 1 35       |
| “ Trieste.....                                   | 1 35       |
| “ Chinese.....                                   | 1 50       |
| Chrome Green.....                                | 16 @ 25    |
| Paris Green.....                                 | 35 @ 45    |
| Litharge, American.....                          | 11         |
| Spanish Brown, dry.....                          | 2½         |
| Paris White.....                                 | 4½ @ 5     |
| Whiting, American.....                           | 3          |

## DRY GOODS.

|   |             |
|---|-------------|
| <b>AMERICAN PRINTED DELAINES—</b>         |             |
| Hamilton.....                             | 18          |
| Manchester.....                           | 18          |
| Lowell.....                               | 17          |
| Sprague's.....                            | 17          |
| Pacific.....                              | 15          |
| All wool.....                             | 25 @ 37½    |
| <b>BALMORAL SKIRTS—</b>                   |             |
| Gilbert's.....                            | \$2 00      |
| Wilcox.....                               | 1 50        |
| Peabody.....                              | 1 08        |
| Amoskeag.....                             | —           |
| National.....                             | 1 25        |
| Raleigh.....                              | —           |
| Peerless.....                             | 2 00        |
| Holyoke.....                              | —           |
| Pontoosuc.....                            | 2 00 @ 2 75 |
| Bruner.....                               | 1 50        |
| <b>BLEACHED SHEETINGS &amp; SHIRTINGS</b> |             |
| New York Mills.....                       | 21          |
| Wamsutta.....                             | 20          |
| Masonville.....                           | 16          |
| Bates.....                                | 18          |
| White Rock.....                           | 17          |
| Bay Mills.....                            | 18½         |
| Lonsdale.....                             | 15½         |
| Androscoggin.....                         | 16          |
| Hills 4-4.....                            | 15          |
| “ 7-8.....                                | 13½         |
| Langdon 7-8.....                          | 13½         |
| “ 4-4.....                                | 14½         |
| Ballou & Son 4-4.....                     | 12½         |
| “ 7-8.....                                | 12½         |
| J. & W. Slater.....                       | 12½         |
| Red Bank.....                             | 10          |
| “ 7-8.....                                | 9           |
| Canoe.....                                | 6½          |
| <b>BROWN SHEETINGS &amp; SHIRTINGS</b>    |             |
| Atlantic A.....                           | 12          |
| Amoskeag A.....                           | 11½         |
| Boot S.....                               | 11½         |
| “ O.....                                  | 10          |
| “ H.....                                  | 9           |
| Cabot A.....                              | 11          |
| Indian Orchard A.....                     | 12½         |
| “ C.....                                  | 10½         |
| “ B B.....                                | 10          |
| “ W.....                                  | 9½          |
| “ L.....                                  | 9           |

|                              |             |
|------------------------------|-------------|
| Pacific A.....               | \$          |
| Pepperell E, fine.....       | 12          |
| “ R, fine.....               | 12½         |
| “ O, fine.....               | 11½         |
| “ N, fine.....               | 10½         |
| Indian Head.....             | 9½          |
| Medford.....                 | 12          |
| Appleton A.....              | 11          |
| Lawrence C.....              | 12          |
| Portsmouth P.....            | 7½          |
| Great Falls S.....           | 10          |
| Agawam F.....                | 8½          |
| American A 4-4.....          | 11½         |
| Pittsburgh Family.....       | 11½         |
| <b>BROWN DRILLS—</b>         |             |
| Pepperell.....               | 12½         |
| Boot.....                    | 12½         |
| Bennington.....              | 12½         |
| Laconia.....                 | 12½         |
| <b>CARPETING—</b>            |             |
| Tapestry, Brussels.....      | 1 50 @ 1 70 |
| Extra 3-Ply Carpeting.....   | 1 70        |
| Imperial 3-Ply.....          | 1 05        |
| Fine 3-Ply.....              | 1 60        |
| Extra Superfine.....         | 1 27½       |
| Medium.....                  | 1 12½       |
| Belgrade Goods.....          | 90          |
| Union Fine.....              | 45 @ 60     |
| <b>CASSIMERES—</b>           |             |
| Farmers & Mechanics.....     | 31          |
| Wabash.....                  | 35          |
| Everett L.....               | 30          |
| “ O.....                     | 30          |
| <b>CORSET JEANS—</b>         |             |
| Amoskeag.....                | 12          |
| Androscoggin.....            | 12          |
| Bates.....                   | 9           |
| Naumkeag.....                | 14½         |
| Pepperell.....               | 12          |
| Indian Orchard imp.....      | 10          |
| Laconia.....                 | 12          |
| Washington satteen.....      | 14          |
| <b>COTTON FLANNELS—</b>      |             |
| Ellerton T.....              | 18          |
| Hamilton.....                | 20          |
| <b>DENIMS—</b>               |             |
| Amoskeag.....                | 26          |
| Columbian.....               | 26          |
| Haymaker.....                | 12½         |
| Manchester.....              | 16          |
| York.....                    | 26          |
| Union.....                   | 12½         |
| Connecticut.....             | 11½         |
| Washington.....              | 12          |
| Blue Hill.....               | 12          |
| Corn City.....               | 12½         |
| <b>DOMESTIC GINGHAMS—</b>    |             |
| Glasgow.....                 | 13          |
| Lancaster.....               | 15          |
| Roanoke.....                 | 11½         |
| Clinton.....                 | 12½         |
| <b>PRINTS—</b>               |             |
| Merimack W.....              | 12          |
| “ D.....                     | 11½         |
| Cocheco L.....               | 11          |
| Sprague's.....               | 10          |
| Richmond's.....              | 10½         |
| American.....                | 10½         |
| Dunell's.....                | 10½         |
| Allen's.....                 | 10½         |
| Garner & Co.....             | 9½          |
| Arnold's.....                | 8½          |
| Wamsutta.....                | 7½          |
| Freeman.....                 | 8½          |
| Pacific.....                 | 11          |
| Lancaster.....               | 10          |
| Gloucester.....              | 10½         |
| Manchester.....              | 10½         |
| <b>STRIPES—</b>              |             |
| Whittenton.....              | 16          |
| “ A.....                     | 12½         |
| “ C.....                     | 12½         |
| Uncasville.....              | 12 @ 13     |
| York.....                    | 22½         |
| American.....                | 11 @ 12     |
| Amoskeag.....                | 17 @ 18     |
| <b>THREADS, &amp;C—</b>      |             |
| J. & P. Coats', per doz..... | 80          |
| Hadley Co.....               | 76          |
| Clark's.....                 | 80          |
| Green & Daniels.....         | 40          |
| Willimantic.....             | 40          |
| Stafford Bro's.....          | 40          |
| White Skein.....             | 60          |

|                          |       |
|--------------------------|-------|
| <b>TICKINGS—</b>         |       |
| Amoskeag A C A.....      | \$ 20 |
| “ A.....                 | 24    |
| “ B.....                 | 20    |
| “ C.....                 | 18    |
| “ D.....                 | 16    |
| Star Mills, 31 inch..... | 16    |
| “ 32 inch.....           | 20    |
| Hamilton D.....          | 21    |
| York, 32 in.....         | 27    |
| York, 30 in.....         | 21½   |
| Albany.....              | 6½    |
| Pemberton.....           | —     |
| “ X.....                 | 16    |
| Swift river.....         | 12½   |

## GROCERIES AND SIMILAR GOODS.

|   |               |
|---|---------------|
| <b>BROOMS—</b>                          |               |
| Extra, No. 1.....                       | \$3 00 @ 3 50 |
| Extra, No. 2.....                       | 2 50 @ 2 75   |
| Extra, No. 3.....                       | 2 00 @ 2 25   |
| Common, plain handles.....              | 2 00 @ 2 50   |
| Heavy Stable.....                       | 5 00          |
| <b>CANDLES—</b>                         |               |
| Mould.....                              | 11½ @ 12      |
| Pressed.....                            | 12½ @ 12½     |
| Stearic Lights.....                     | 13 @ 15       |
| Star.....                               | 12½ @ 16      |
| <b>COFFEES—</b>                         |               |
| Rio, Choice.....                        | 10½           |
| Rio, Prime.....                         | 18¾           |
| Rio, Fair to good.....                  | 18 @ 18¾      |
| Rio, Common to Fair.....                | 17½ @ 17¾     |
| O. G. Java.....                         | —             |
| Java.....                               | —             |
| <b>FISH—</b>                            |               |
| No. 1 White Fish, half<br>brl.....      | 6 25 @ 6 50   |
| No. 2 White Fish, half<br>brl.....      | 5 75 @ 6 00   |
| No. 1 Trout, half brl.....              | 4 50 @ 4 75   |
| No. 1 Lake Herring,<br>half barrel..... | 4 00 @ 5 00   |
| Dutch Herring, ½ keg,<br>new.....       | — @ —         |
| Scaled Herring, new,<br>½ box.....      | — @ —         |
| No. 1 Dried Herring,<br>new, ½ box..... | 50            |
| Codfish, summer-cured<br>½ box.....     | 7 25 @ 7 50   |
| Mackerel, No. 1, half<br>brls.....      | 11 00 @ 11 50 |
| Mackerel, family, new.....              | 6 00 @ 8 00   |
| Mackerel No. 1, kits.....               | 1 25 @ 2 50   |
| Mackerel, extra mess,<br>half brl.....  | 11 00 @ 11 50 |
| Mackerel, family, kits.....             | 1 50 @ 1 90   |
| <b>RICE—</b>                            |               |
| Carolina.....                           | 9½ @ 9¾       |
| Rangoon.....                            | 8 @ 8½        |
| <b>SALT—</b>                            |               |
| Domestic, fine, ½ brl.....              | 2 05          |
| Domestic, coarse C.....                 | 2 25          |
| Domestic, ground Sol'r.....             | 2 30          |
| Dairy, Ashton.....                      | 5 50          |
| Dairy, with bags.....                   | 5 50 @ 5 70   |
| Dairy, without bags.....                | 4 50 @ 4 75   |
| Ground Alum, sack.....                  | 1 60 @ 1 05   |
| <b>SOAP—</b>                            |               |
| Palm.....                               | 4¾            |
| Detersive.....                          | 5¾ @ 6        |
| Chemical Erasive, im-<br>proved.....    | 5¾ @ 6        |
| Castile, American.....                  | 11 @ 12       |
| Castile, genuine.....                   | 14 @ 15       |
| Babbitt's N. Y. City.....               | 7¾ @ 7½       |
| <b>SPICES—</b>                          |               |
| Pepper.....                             | 21 @ 22       |
| Pimento.....                            | 14 @ 15       |
| Cloves.....                             | 21 @ 22       |
| Cassia.....                             | 45 @ 50       |
| Nutmegs.....                            | 1 05 @ 1 10   |
| <b>SALERATUS AND SODA—</b>              |               |
| Snowflake Saleratus.....                | —             |
| Babbitt's Pure.....                     | 9             |
| Babbitt's Best.....                     | 9¾            |
| De Land's Pure.....                     | 9½ @ 10½      |
| De Land's Healthy.....                  | 10 @ 10½      |
| De Land's Chemical.....                 | 10 @ 10½      |
| S. C. Soda, English.....                | 6½ @ 7        |
| S. C. Soda, American.....               | 6 @ 6½        |

|                         |          |     |
|-------------------------|----------|-----|
| STARCH—                 |          |     |
| Peoria Corn.....        | \$ 11¼ @ | 12¼ |
| Pure Oswego.....        | 11 @     | 11½ |
| Silver Gloss.....       | 12½ @    | 12¾ |
| Corn.....               | 12½ @    | 12¾ |
| Crystal Starch, Peoria. | 7½ @     | 8½  |
| Satin Glaze, Peoria.... | 10 @     | 10½ |

|                           |       |     |
|---------------------------|-------|-----|
| SUGARS, RAW—              |       |     |
| Cuba, fair.....           | 11 @  | 12½ |
| Cuba, good.....           |       | 11¾ |
| Cuba, choice.....         |       | 11¾ |
| P. R., good to choice.... | 11¼ @ | 11¾ |

|                       |       |     |
|-----------------------|-------|-----|
| SUGARS, REFINED—      |       |     |
| Crushed, Powdered,    |       |     |
| and Granulated....    | 14 @  | 14¼ |
| A. Coffee, standard.. | 13 @  | 13¾ |
| (A.) Coffee.....      | 12¾ @ | 13  |
| B. Coffee.....        | 12¾ @ | 13  |
| Extra C, standard.... | 12¾ @ | 13  |
| C., Standard.....     | 12½ @ | 12¾ |

|                  |        |      |
|------------------|--------|------|
| SYRUPS—          |        |      |
| White Drips..... | 1 00 @ | 1 15 |
| Choice.....      | 80 @   | 85   |
| Fair.....        | 55 @   | 60   |
| Common.....      | 35 @   | 40   |

|                 |        |      |
|-----------------|--------|------|
| TEAS.           |        |      |
| HYSON—          |        |      |
| Common.....     | 70 @   | 80   |
| Fair.....       | 90 @   | 1 10 |
| Fine.....       | 1 20 @ | 1 30 |
| Extra Fine..... | 1 35 @ | 1 40 |
| Choice.....     | 1 60 @ | 1 65 |

|                 |        |      |
|-----------------|--------|------|
| YOUNG HYSON—    |        |      |
| Inferior.....   | 50 @   | 60   |
| Common.....     | 70 @   | 80   |
| Fair.....       | 90 @   | 1 10 |
| Superior.....   | 1 20 @ | 1 30 |
| Good.....       | 1 20 @ | 1 35 |
| Fine.....       | 75 @   | 85   |
| Extra Fine..... | 1 35 @ | 1 40 |
| Finest.....     | 1 40 @ | 1 50 |
| Choice.....     |        | 1 60 |

|                 |        |      |
|-----------------|--------|------|
| GUNPOWDER—      |        |      |
| Common.....     | 75 @   | 90   |
| Superior.....   | 1 00 @ | 1 10 |
| Fine.....       | 1 20 @ | 1 30 |
| Extra Fine..... | 1 35 @ | 1 40 |
| Finest.....     | 1 50 @ | 1 65 |
| Choice.....     | 1 60 @ | 1 75 |

|                 |        |      |
|-----------------|--------|------|
| IMPERIAL—       |        |      |
| Common.....     | 45 @   | 55   |
| Superior.....   | 65 @   | 75   |
| Fine.....       | 95 @   | 1 00 |
| Extra Fine..... | 1 10 @ | 1 40 |
| Choice.....     |        | 1 60 |

|                 |      |      |
|-----------------|------|------|
| JAPAN—          |      |      |
| Common.....     | 50 @ | 60   |
| Superior.....   | 70 @ | 85   |
| Fine.....       | 85 @ | 90   |
| Extra Fine..... | 95 @ | 1 00 |
| Choice.....     |      | 1 15 |

|                 |        |      |
|-----------------|--------|------|
| OOLONG—         |        |      |
| Inferior.....   | 40 @   | 55   |
| Common.....     | 60 @   | 70   |
| Superior.....   | 80 @   | 90   |
| Fine.....       | 90 @   | 1 00 |
| Extra Fine..... | 1 05 @ | 1 10 |
| Finest.....     | 1 15 @ | 1 20 |
| Choice.....     | 1 25 @ | 1 30 |

|                   |      |      |
|-------------------|------|------|
| TOBACCO.          |      |      |
| PLUG—             |      |      |
| Navies.....       | 55 @ | 60   |
| Common.....       | 55 @ | 60   |
| Fine.....         | 70 @ | 80   |
| Natural Leaf..... | 85 @ | 1 00 |

|              |      |    |
|--------------|------|----|
| FINE CUT—    |      |    |
| Choice.....  | 90 @ | 95 |
| Medium.....  | 75 @ | 80 |
| Common.....  | 55 @ | 70 |
| Smoking..... | 24 @ | 30 |

|                        |      |    |
|------------------------|------|----|
| VINEGAR—               |      |    |
| Cider Vinegar, p gal.. | 18 @ | 20 |
| Malt Vinegar, p gal..  | 16 @ | 18 |
| White Wine, p gal....  | 25 @ | 30 |

|                        |        |      |
|------------------------|--------|------|
| WOODENWARE—            |        |      |
| Two-hoop painted Pails | 2 00 @ | 2 25 |
| Two-hoop painted Dairy |        |      |
| Pails.....             |        | 3 75 |
| Three-hoop Dairy Pails |        | 4 50 |
| Three-hoop painted...  | 2 25 @ | 2 50 |

|                         |        |       |
|-------------------------|--------|-------|
| Extra Cheese Tubs,      |        |       |
| three-hoop.....         | \$     | 12 50 |
| No. 1 Tubs, 3-hoop...   |        | 10 00 |
| No. 2 Tubs, 2-hoop...   |        | 9 00  |
| No. 3 Tubs, 2-hoop...   |        | 8 00  |
| Half-bushel measures,   |        |       |
| red.....                | 4 60   |       |
| Peck Measures, red...   | 3 75   |       |
| Churns, No. 1, 22-inch. | 11 50  |       |
| Churns, No. 2, 20-inch. | 10 50  |       |
| Churns, No. 3, 18-inch. | 9 50   |       |
| Churns, No. 4, 16-inch. | 7 00 @ | 7 50  |
| Headed Clothes-pins,    |        |       |
| (five gross).....       | 1 15 @ | 1 25  |
| Butter Tubs.....        |        | 1 05  |

## HARDWARE.

### IRON, STEEL, NAILS, AND KINDRED BRANCHES.

|                         |       |  |
|-------------------------|-------|--|
| AXES—                   |       |  |
| Hunt's and Blodgett's.  | 12 00 |  |
| Graff's and Blood's.... | 11 50 |  |
| Simmons'.....           | 11 50 |  |
| Simmons' patent.....    | 13 00 |  |
| Fenn's warranted.....   | 11 00 |  |

|                          |                      |  |
|--------------------------|----------------------|--|
| AUGERS—                  |                      |  |
| Best C. S. Cut.....      | 25 p cent. off list. |  |
| 2d quality C. S. Cut.... | 45 p cent. dis.      |  |

|                    |    |  |
|--------------------|----|--|
| BRASS KETTLES—     |    |  |
| Brass Kettles..... | 55 |  |

|                                |                      |  |
|--------------------------------|----------------------|--|
| BUTTS—                         |                      |  |
| Cast, fast joint.....          | 30 p cent. off list. |  |
| Cast, loose joint.....         | 40 p cent. off list. |  |
| Roye's wrought, fast           |                      |  |
| joint.....                     | 30 p cent. off list. |  |
| Roye's table.....              | 25 p cent. off list. |  |
| Parker's blind Butts,          |                      |  |
| for wood, p case.....          | 3 25                 |  |
| Parker's blind Butts,          |                      |  |
| for brick.....                 | 4 75                 |  |
| CARRIAGE BOLTS—60 p cent. dis. |                      |  |

|                   |           |  |
|-------------------|-----------|--|
| CASTORS—          |           |  |
| Plate.....        | Net list. |  |
| Bed, 2-inch.....  | Net list. |  |
| Bed, 1½-inch..... | Net list. |  |

|                   |                          |  |
|-------------------|--------------------------|--|
| CHISELS—          |                          |  |
| Best framing..... | 50 p cent. off new list. |  |
| Firmer, best..... | 30 p cent. off new list. |  |

|                        |    |  |
|------------------------|----|--|
| CHAIN—                 |    |  |
| Bright log, 5-16-inch, |    |  |
| p lb.....              | 12 |  |
| Bright log, ¾-inch.... | 8½ |  |

|                     |           |  |
|---------------------|-----------|--|
| CUTLERY—            |           |  |
| American Table..... | New list. |  |

|                         |                     |  |
|-------------------------|---------------------|--|
| DRAWING KNIVES—         |                     |  |
| Witherby, from list.... | 50 and 20 p ct. off |  |

|                        |                 |  |
|------------------------|-----------------|--|
| ENAMELED KETTLES—List. |                 |  |
| FILES—                 |                 |  |
| Butchers'.....         | 30 p cent. dis. |  |
| Best America.....      | 40 p cent. dis. |  |

|                   |       |  |
|-------------------|-------|--|
| GRINDSTONES—      |       |  |
| Huron, p ton..... | 20 00 |  |

|                        |                     |  |
|------------------------|---------------------|--|
| PLANES—                |                     |  |
| According to quality.. | 10 to 20 p ct. dis. |  |

|                        |                     |  |
|------------------------|---------------------|--|
| SCREWS—                |                     |  |
| Amer'n gimlet-point... | 45 p ct. from list. |  |

|                        |      |  |
|------------------------|------|--|
| STOVE POLISH—          |      |  |
| Joseph Dixon's, p gr.. | 6 75 |  |

|                          |               |  |
|--------------------------|---------------|--|
| SAD IRON—                |               |  |
| Extra polish, p 100 lbs. | 4 25          |  |
| SQUARES—                 |               |  |
| Steel and Iron.....      | At list, net. |  |

|                       |         |       |
|-----------------------|---------|-------|
| SAWS—                 |         |       |
| Spear & Jackson's 26- |         |       |
| inch, p doz.....      | 20 00 @ | 23 00 |
| Disston, No. 7.....   |         | 21 00 |

|                        |      |  |
|------------------------|------|--|
| SPOONS—                |      |  |
| Alabata tea, p gross.. | 7 00 |  |
| German silver tea, p   |      |  |
| doz.....               | 1 25 |  |

|                        |                 |       |
|------------------------|-----------------|-------|
| Plated tea.....        | 25 p cent. off. |       |
| Alabata table, p gross |                 | 16 00 |
| German silver plated,  |                 |       |
| p doz.....             | 2 50            |       |

|                   |                |  |
|-------------------|----------------|--|
| Plated table..... | 5 p cent. off. |  |
|-------------------|----------------|--|

|                              |  |  |
|------------------------------|--|--|
| TINNERS' TOOLS AND MACHINES— |  |  |
| List.                        |  |  |

|                      |                      |  |
|----------------------|----------------------|--|
| WRENCHES—            |                      |  |
| Coe's genuine.....   | 50 p cent. off.      |  |
| Coe's imitation..... | 30 p cent. off.      |  |
| Taft's.....          | 50 and 20 p ct. off. |  |

## IRON, STEEL, AND NAILS.

[It is understood that large lots, for shipment from mills, or from store, can be placed at special rates.]

|                               |         |
|-------------------------------|---------|
| FLAT BAR—                     | Per lb. |
| 1½ to 4, by ¾ to 1 inch.....  | 3¾      |
| 2½ to 6, by ¾ to 1 inch.....  | 4¾      |
| 4 to 4, by 1½ to 1½ inch..... | 4¾      |
| 4½ to 6, by 1½ to 1½.....     | 4¾      |
| 1½ to 1½, by ¾ to ¾ inch....  | 4¾      |

|                                  |    |
|----------------------------------|----|
| HEAVY BAND IRON—                 |    |
| 2 to 4, by 5-16 to 3-16 inch.... | 4½ |
| 4½ to 6, by 5-16 to 3-16 inch..  | 5  |
| 1½ to 1½, by 5-16 to 3-16 inch.. | 4¾ |
| ¾ to 1½, by 5-16 to 3-16 inch..  | 5  |
| ½ to ¾, by 5-16 to 3-16 inch...  | 5¾ |

|                                |        |
|--------------------------------|--------|
| HORSE SHOE—                    |        |
| ¾ to 1, by 5-16 to ¾ inch..... | 5 @ 6¾ |

|                      |    |
|----------------------|----|
| HOOP AND LIGHT BAND— |    |
| 2½ to 3 inch.....    | 4¾ |
| 4½ to 4¾ inch.....   | 5  |
| 5 to 6 inch.....     | 5¾ |
| 1¾ and 2 inch.....   | 5  |
| 1½ inch.....         | 5¾ |
| 1½ and 1¾ inch.....  | 5½ |
| 1 inch.....          | 6  |
| ¾ inch.....          | 7  |
| ¾ inch.....          | 8¼ |
| ¾ inch.....          | 9¼ |

|  |  |
|--|--|
| Hoops cut to specified lengths, ¾ cent p lb extra. |  |
|--|--|

|                        |    |
|------------------------|----|
| ROUND AND SQUARE—      |    |
| 1 to 1½ inch.....      | 3½ |
| 2 to 2¾ inch.....      | 3¾ |
| 3 to 3½ inch.....      | 4  |
| 3½ to 4 inch.....      | 4½ |
| 4 to 4½ inch.....      | 5  |
| 4½ to 5 inch.....      | 5  |
| 5 and ¾ inch.....      | 3¾ |
| 5 and 9-16 inch.....   | 4  |
| ½ to 7-16, ¾ inch..... | 4¾ |
| 5-16 inch.....         | 4¾ |
| 1½ inch.....           | 5¾ |
| ¾ inch.....            | 7½ |

|                   |    |
|-------------------|----|
| OVAL IRON—        |    |
| ¾ to 1½ inch..... | 4  |
| ¾ to ¾ inch.....  | 4¾ |
| ½ inch.....       | 4½ |
| 3-16 inch.....    | 4¾ |

|                           |    |
|---------------------------|----|
| HALF OVAL AND HALF ROUND— |    |
| ¾, ¾ to 1½ inch.....      | 4¾ |
| ¾ and ¾ inch.....         | 4½ |
| ½ inch.....               | 5  |
| ¾ inch.....               | 5½ |

|                        |    |
|------------------------|----|
| Wagon-box, ¾ inch..... | 7¾ |
| Wagon-box, ¾ inch..... | 8¼ |

Refined extra iron 1c p lb over and above quotations.

|                                 |          |
|---------------------------------|----------|
| STEEL—                          |          |
| Steel plow cast, Am.....        | 12       |
| Steel plow.....                 | 9½       |
| Steel Blister, Amer.....        | 20       |
| Steel Blister, Eng. [M].....    | 22       |
| Steel Blister, Eng. [L].....    | 22       |
| Steel tools, English.....       | 20       |
| Steel tools, American.....      | 18       |
| Steel, sheet.....               | 22       |
| Steel machinery.....            | 15 @ 17  |
| German American plow steel..... | 12½ @ 13 |
| Jenks' Eng. Ger. plow steel..   | 9½       |
| Bessemer cast.....              | 11       |

|                              |         |
|------------------------------|---------|
| HORSE NAILS—                 |         |
| U. B. horse nails.....       | 22 @ 30 |
| Two-forty, hand-pointed, ex- |         |
| tra quality, 8d.....         | 22 @ 30 |
| Northwestern, 8d.....        | 22 @ 30 |
| Ausable, 8d.....             | 22 @ 30 |

|                 |          |
|-----------------|----------|
| NAILS—          | Per keg. |
| 10d to 6d.....  | \$ 4 75  |
| 8d and 9d.....  | 5 00     |
| 6d and 7d.....  | 5 25     |
| 4d and 5d.....  | 5 50     |
| 3d.....         | 6 00     |
| 2d.....         | 7 50     |
| 3d, fine.....   | 7 50     |
| 2d, fine.....   | 8 50     |
| ¾ lining.....   | 9 00     |
| Clinch.....     | 7 00     |
| Cut spikes..... | 5 00     |



| CASING NAILS— |        | Per keg. |
|---------------|--------|----------|
| 6d.....       | \$6 00 |          |
| 8d.....       | 5 75   |          |
| 10d.....      | 5 50   |          |
| 12d.....      | 5 50   |          |
| 16d.....      | 5 50   |          |

| FINISHING NAILS—    |      |  |
|---------------------|------|--|
| 6d.....             | 6 50 |  |
| 8d.....             | 6 25 |  |
| rod and larger..... | 6 00 |  |

| BARREL NAILS— |      |  |
|---------------|------|--|
| ¾ inch.....   | 7 50 |  |
| 1 inch.....   | 7 00 |  |
| 1½ inch.....  | 6 25 |  |
| 1¾ inch.....  | 6 00 |  |
| 1½ inch.....  | 6 00 |  |
| 1½ inch.....  | 5 25 |  |

| TOBACCO NAILS— |      |  |
|----------------|------|--|
| 6d.....        | 5 50 |  |
| 8d.....        | 5 25 |  |
| 10d.....       | 5 00 |  |

| GAS PIPE—  |            |                |
|--|------------|----------------|
| Gas pipe.....                                    | 46 ¢       | cent off list. |
| Pipes for well-drivers, galvanized and iron..... | 25 to 46 ¢ | ct. off list.  |

| HORSE SHOES—  |      |     |
|---|------|-----|
| Berdan's.....   | 5 50 |     |
| Excelsior.....  | 7 50 |     |
| Thimble skains and boxes, Eastern manufacture, dis. 30 ¢ cent.  |      |     |
| Thimble skains and boxes, Western manufacture, dis. 45 to 52½ ¢ |      | ct. |
| Nor. nail rods.....   | 7½ ¢ | @S  |

| AXLES—   |      |  |
|--|------|--|
| Common, well-finished, ½ lb.....                                     | 7½ ¢ |  |
| Half Pat., well-finished, oil grove 1 inch axles, 1 cent ½ lb extra. | 9 ¢  |  |

| BOILER IRON—   |      |       |
|--|------|-------|
| S. F. B., best fire-box iron.....                              | 9½ ¢ |       |
| C. H. No. 1, best flanching iron.....                          | 8 ¢  |       |
| C. H. No. 1, charcoal, H. shell.....                           | 7 ¢  |       |
| C. No. 1, for shells and other purposes.....                   | 6 ¢  |       |
| Circle heads, S. F. B.....                                     | 9½ ¢ |       |
| Heavy sheet, best annealed, Nos. 8 to 16, 30-32 in wide.....   | 5½ ¢ | @ 6   |
| Boiler rivets, best Troy make, Tank rivets, Juniata stock..... | 18 ¢ | @ 24  |
| Angle Iron.....  | 7½ ¢ | @ 8   |
| Boiler Tubes.....  |      | List. |
| Freight added.   |      |       |

| PIG IRON—   |                 |  |
|---|-----------------|--|
| Scotch Pig Iron, according to brand.....            | \$41 00 @ 44 00 |  |
| Briar Hill, No. 1.....                              |                 |  |
| Briar Hill, No. 2.....                              |                 |  |
| Massillon, No. 1.....                               |                 |  |
| Massillon, No. 2.....                               |                 |  |
| Lake Superior, Nos. 1 & 2.....                      | 42 00 @ 43 00   |  |
| Lake Superior, Nos. 3, 4 and 6, for car wheels..... | 44 00           |  |
| Union Pig Iron, A No. 1.....                        |                 |  |
| Union Pig Iron, B No. 1.....                        |                 |  |
| Union Pig Iron, No. 2.....                          |                 |  |
| Tuscarawas, No. 1.....                              | 43 00           |  |
| Tuscarawas, No. 2.....                              | 40 00           |  |
| Tuscarawas, B No. 1.....                            | 41 00           |  |
| Salisbury, Nos. 1 and 2.....                        | 70 00           |  |
| Salisbury, Nos. 3 and 4.....                        | 70 00           |  |
| Woodville, Nos. 1 and 2.....                        | 58 00           |  |

| METAL—                        |               | ½ ton. |
|-------------------------------|---------------|--------|
| No. 1 wrought Scrap Iron..... | 28 00 @ 30 00 |        |
| Old Steam Boilers.....        | 20 00         |        |
| Boiler, Plate, and Scrap..... | 25 00 @ 27 00 |        |
| Cast Scrap, mixed.....        | 25 00 @ 27 00 |        |
| Old Copper.....               | 10 @ 12       |        |
| Brass.....                    | 10 @ 12       |        |
| Pewter.....                   | 15            |        |

| TINNERS' STOCK.        |       |  |
|------------------------|-------|--|
| TIN PLATE—             |       |  |
| 10X14 IC Charcoal..... | 10 50 |  |
| do IX do.....          | 13 50 |  |
| 12X12 IC do.....       | 11 00 |  |
| do IX do.....          | 14 00 |  |
| 14X20 IC do.....       | 11 50 |  |
| do IX do.....          | 15 00 |  |
| do XX do.....          | 18 50 |  |
| do XXX do.....         | 22 00 |  |

| Roofing, IC Coke..... | \$10 00 |  |
|-----------------------|---------|--|
| do IC Charcoal.....   | 10 50   |  |
| do IX do.....         | 13 00   |  |
| BLOCK TIN—            |         |  |
| Large Pigs.....       | 43      |  |
| Small Pigs.....       | 44      |  |
| Bar.....              | 45      |  |

| COPPER—             |    |  |
|---------------------|----|--|
| Tinned.....         | 31 |  |
| Copper Bottoms..... | 35 |  |
| Alloy Bottoms.....  | 25 |  |
| Alloy sheets.....   | 23 |  |
| Brazier's.....      | 31 |  |

| ZINC—                   |      |  |
|-------------------------|------|--|
| Sheet, by the cask..... | 9½ ¢ |  |
| “ less than cask.....   | 10 ¢ |  |
| Slab.....               | 9 ¢  |  |
| Antimony, ½ lb.....     | 30 ¢ |  |

| SHEET IRON—                      |         |  |
|----------------------------------|---------|--|
| No. 10 to 24 rates, common.....  | 5½ ¢    |  |
| All sheets over 28 inch wide ¼ c |         |  |
| ½ lb extra.....                  |         |  |
| Galvanized Iron.....             | 15      |  |
| Russia Iron.....                 | 16 @ 18 |  |

| IMITATION RUSSIA—              |    |  |
|--------------------------------|----|--|
| 1st quality, No. 24 to 27..... | 13 |  |
| 2d “.....                      | 11 |  |

| FENCE WIRE—                            |    |  |
|--|----|--|
| Nos. 8 and 9.....                      | 10 |  |
| Bright Wire. At 10 per cent. off list. |    |  |
| Babbitt Metal, Allen's.....            | 30 |  |
| Fence Staples.....                     | 13 |  |

## LUMBER AND BUILDING MATERIALS. •

|  |                       |
|--|-----------------------|
| First Clear, 1 to 2 in, ½ M \$45 00 @ 50 00      |                       |
| Second Clear, 1 to 2 in, ½ M 43 00 @ 45 00       |                       |
| Third Clear, 2 in and 1½, ½ M 40 00 @ 45 00      |                       |
| “ 1½ in ½ M 43 00                                |                       |
| Third Clear, 1½ in ½ M 35 00 @ 40 00             |                       |
| Stock Boards, A.....                             | 26 00 @ 28 00         |
| “ “ A, select.....                               | 32 00 @ 35 00         |
| “ “ B.....                                       | 20 00 @ 22 00         |
| Box Boards, select.....                          | 34 00 @ 35 00         |
| “ common.....                                    | 22 00 @ 25 00         |
| Common Boards.....                               | 14 00 @ 15 00         |
| Fencing.....                                     | 14 00                 |
| First and Second Clear Flooring, rough.....      | 35 00 @ 38 00         |
| Common Flooring, dress'd.....                    | 25 00 @ 32 00         |
| Second Flooring, dress'd.....                    | 25 00 @ 28 00         |
| Siding, clear, dress'd.....                      | 21 00                 |
| “ Second cl'r, dress'd.....                      | 20 00                 |
| Common Siding, dress'd.....                      | 17 00 @ 18 00         |
| Cull Boards.....                                 | 11 00                 |
| Scantling and Joist, 16 ft long and under.....   | 14 00                 |
| Scantling and Joist, 18 ft long.....             | 16 00 @ 17 00         |
| Scantling and Joist, 20 and 22 ft long.....      | 18 00 @ 20 00         |
| Scantling and Joist, 24 and 26 ft long.....      | 22 00 @ 24 00         |
| Timber, 16 ft long & under 20 to 30 ft long..... | 14 00 @ 18 00 @ 28 00 |
| Shingles, sawed, A.....                          | 3 62 @ 3 75           |
| Lathe, ½ 1,000.....                              | 2 50                  |
| Posts, ½ 100.....                                | 15 00 @ 40 00         |
| Pickets, ½ 1,000.....                            | 10 00 @ 12 00         |

| SHINGLE STANDARD—                  |               | Length, 16 inches; thickness, 5 shingles to be 2 inches; bands, 20 inches; packages, 25 courses. |
|------------------------------------|---------------|--|
| Shingles by car-load on track..... | \$3 37½       |  |
| HARDWOOD—                          |               |  |
| Oak.....                           | 20 00 @ 40 00 |  |
| Ash.....                           | 25 00 @ 40 00 |  |
| Black Walnut.....                  | 45 00 @ 70 00 |  |
| Cherry.....                        | 25 00 @ 65 00 |  |
| Whitewood, clear.....              | 30 00 @ 40 00 |  |
| “ common.....                      | 20 00         |  |
| Maple.....                         | 20 00 @ 35 00 |  |
| Hickory.....                       | 20 00 @ 30 00 |  |

| LIME, CEMENT, &C.—                   |             |  |
|--------------------------------------|-------------|--|
| Lime in bulk.....                    | 1 00 @ 1 25 |  |
| Lime in brls.....                    | 1 25 @ 1 50 |  |
| Rosendale Cement.....                | 3 00 @ 3 25 |  |
| Clark's Cement.....                  | 2 25 @ 2 50 |  |
| Akron Cement, ½ brl, star brand..... | 1 85 @ 2 00 |  |

|                                 |               |  |
|---------------------------------|---------------|--|
| Louisville Cement.....          | \$1 85 @ 2 00 |  |
| Fire Clay.....                  | 4 00 @ 4 50   |  |
| Fire Brick, ½ 1,000.....        | 70 00 @ 80 00 |  |
| Marble Dust, ½ brl.....         | 3 25 @ 3 50   |  |
| Brick, ½ 1,000.....             | 13 00 @ 15 00 |  |
| Michigan Stucco.....            | 3 00 @ 5 00   |  |
| Land Plaster, ½ brl.....        | 2 00 @ 2 25   |  |
| Plastering Hair, dry, ½ bu..... | 40 @ 45       |  |
| White Sand, ½ brl.....          | 3 00 @ 3 25   |  |

## NAVAL STORES.

|                                   |             |  |
|-----------------------------------|-------------|--|
| Rosin, ½ 280 lbs.....             | 4 00 @ 5 00 |  |
| Tar, pine.....                    | 5 00 @ 5 50 |  |
| Coal tar.....                     | 5 00        |  |
| Pitch, North Carolina.....        | 4 50 @ 6 00 |  |
| “ Roofing.....                    | 4 00        |  |
| Spirits of Turpentine, ½ gal..... |             |  |
| Oakum, ½ bale.....                | 6 00 @ 6 50 |  |

## CORDAGE AND TWINES.

| CORDAGE—                             |             |  |
|--------------------------------------|-------------|--|
| 6 and 8-thread Manila rope ½ lb..... | 10          |  |
| 12-thread.....                       | 18½         |  |
| 15-thread and over.....              | 18          |  |
| Sisal rope, ¼ and ½.....             | 18          |  |
| “ ½ in and over.....                 | 17          |  |
| Jute rope, ¼ and ½.....              | 15          |  |
| Hemp sash cord, on reels.....        | 23          |  |
| Hemp sash cord, in doz's.....        | 15          |  |
| Hemp packing, on reels.....          | 14 @ 18     |  |
| Hemp bed cords, 60 ft.....           | 2 50        |  |
| “ “ 90 ft.....                       | 3 00        |  |
| Cotton seine twine.....              | 43 @ 46     |  |
| Tarred lath yarn.....                | 14 @ 18     |  |
| “ spun yarn.....                     | 20          |  |
| Manila lath yarn.....                | 23½         |  |
| Sisal bed cord, 7½ feet.....         | 2 50        |  |
| Jute bed cords.....                  | 2 50 @ 2 75 |  |

## TWINES—

|                                   |         |  |
|-----------------------------------|---------|--|
| 1-ply jute wrapping.....          | 18      |  |
| 2-ply “.....                      | 23      |  |
| Cotton wrapping.....              | 25 @ 30 |  |
| Manila, wrapping, plain.....      | 23      |  |
| 2-strand hemp.....                | 20 @ 24 |  |
| 3-strand hemp.....                | 23 @ 25 |  |
| 4-strand jute wool, in balls..... | 14      |  |
| 3-ply flax sail, or sacking.....  | 32 @ 35 |  |
| 4-ply “.....                      | 32 @ 35 |  |
| 6-ply “.....                      | 32 @ 35 |  |
| Candle wick.....                  | 40 @ 50 |  |

## PAPER.

| PRINTING—        |         |  |
|------------------|---------|--|
| Straw, ½ lb..... | 12      |  |
| Rag.....         | 13 @ 14 |  |
| Book.....        | 10 @ 20 |  |

## PAPER STOCK.

|                       |        |  |
|-----------------------|--------|--|
| White rags.....       | 7 @ 7½ |  |
| Seconds.....          | 5 @ 7  |  |
| Cotton mixed.....     | 5      |  |
| City rags.....        | 3½     |  |
| Rope, cable.....      |        |  |
| Bargain.....          | 3½     |  |
| Print papers.....     | 4 @ 5  |  |
| Common papers.....    |        |  |
| Woolens.....          | 1      |  |
| Soft Woolen rags..... | 6      |  |

## WOOL.

|  |         | ½ lb. |
|--|---------|-------|
| Tub, extra clear.....                    | 50 @ 53 |       |
| Fleece, common.....                      | 42 @ 50 |       |
| Fleece, XX, good condition, light.....   | 46 @ 48 |       |
| “ XX, bad condition, heavy.....          | 35 @ 40 |       |
| “ X, good condition, light.....          | 40 @ 48 |       |
| “ X, bad condition, heavy.....           | 35 @ 40 |       |
| “ medium good condition, light.....      | 46 @ 50 |       |
| Fleece, medium bad condition, heavy..... | 35 @ 40 |       |
| Fleece, coarse, light and clean.....     | 40 @ 48 |       |
| “ dingy.....                             | 35 @ 40 |       |
| “ unwashed, fine.....                    | 25 @ 28 |       |
| “ coarse.....                            | 27 @ 32 |       |
| Dingy and unsightly lots.....            | 27      |       |

## RAILROAD TIME-TABLE.

## Arrival and Departure of Trains.

## MICHIGAN CENTRAL AND GREAT WESTERN RAILWAYS.

Union Depot—Foot of Lake street. Ticket Office, 93 Lake street, corner Dearborn.

|  | Leave.     | Arrive.    |
|--|------------|------------|
| Mail (via main line and air-line)..... | * 5.40 a m | *8.30 p m  |
| Fast New York Express.....             | * 9.00 a m | *8.00 p m  |
| Atlantic Express (daily).....          | 5.15 p m   | 8.00 a m   |
| Night Express.....                     | *†9.00 p m | *‡6.30 a m |

## LOCAL TRAINS.

|                                    |            |            |
|------------------------------------|------------|------------|
| Kalamazoo and Three Rivers Accom.* | 4.10 p m   | *11.30 a m |
| Grand Rapids Express.....          | * 9.00 a m | *8.00 p m  |
| Night do .....                     | *†9.00 p m | *‡6.30 a m |

## CINCINNATI AND LOUISVILLE.

|                   |            |            |
|-------------------|------------|------------|
| Day Express ..... | * 9.30 a m | *9.20 p m  |
| Night do .....    | *†6.30 p m | *‡6.30 a m |

## CHICAGO, DANVILLE AND VINCENNES RAILROAD.

Milwaukee Depot, corner Canal and Kinzie streets, West Side. Freight Office at C., C. & I. C. Co.'s Office, corner Halsted and Carroll streets.

|                               |          |           |
|-------------------------------|----------|-----------|
| Mail Train, Chicago time..... | 3.40 p m | 10.55 a m |
|-------------------------------|----------|-----------|

## CHICAGO, ROCK ISLAND AND PACIFIC.

Ticket Office, No. 37 South Clark street.

|                            |            |           |
|----------------------------|------------|-----------|
| Pacific Day Express.....   | *10.00 a m | *4.15 p m |
| Peru Accommodation.....    | * 4.30 p m | *9.45 a m |
| Pacific Night Express..... | *10.00 p m | *7.00 a m |

## ILLINOIS CENTRAL RAILROAD CO.

|                             |             |            |
|-----------------------------|-------------|------------|
| St. Louis Express .....     | * 9.20 a m  | *8.00 p m  |
| St. Louis Fast Line.....    | *† 8.15 p m | *7.00 a m  |
| Cairo Mail.....             | * 9.20 a m  | *4.35 p m  |
| Cairo Express.....          | * 8.15 p m  | *7.00 a m  |
| Keokuk Passenger.....       | * 9.20 a m  | *7.45 a m  |
| Champaign Passenger.....    | * 5.15 p m  | *9.00 a m  |
| Hyde Park and Oakwoods..... | * 6.15 a m  | *7.45 a m  |
| Hyde Park and Oakwoods..... | * 9.45 a m  | *11.00 a m |
| Hyde Park and Oakwoods..... | *12.10 p m  | *1.45 p m  |
| Hyde Park and Oakwoods..... | * 3.00 p m  | *5.15 p m  |
| Hyde Park and Oakwoods..... | * 6.10 p m  | *7.35 p m  |
| Hyde Park and Oakwoods..... | *11.00 p m  | .....      |

## CHICAGO, ALTON AND ST. LOUIS.

|                           |             |            |
|---------------------------|-------------|------------|
| Express Mail.....         | * 9.15 a m  | *8.05 p m  |
| Joliet Accommodation..... | * 4.00 p m  | *9.40 a m  |
| Night Express.....        | 5.30 p m    | *12.50 a m |
| Lightning Express.....    | *† 9.00 p m | *7.30 a m  |

## CHICAGO AND NORTHWESTERN.

Ticket Office, southeast corner of Clark and Lake streets—Council Bluffs and Omaha Line—Depot, corner North Water and Wells streets.

|                             |             |            |
|-----------------------------|-------------|------------|
| Cedar Rapids Passenger..... | * 8.30 a m  | *6.45 p m  |
| Pacific Fast Line.....      | *10.45 a m  | *4.15 p m  |
| Iowa Passenger.....         | *†10.00 p m | *‡6.00 a m |
| Dixon Passenger.....        | * 4.00 p m  | *11.10 a m |

## FREEPORT LINE.

|                             |            |            |
|-----------------------------|------------|------------|
| Freeport and Dunleith.....  | * 9.00 a m | *2.30 p m  |
| Freeport and Dunleith.....  | * 9.00 p m | *7.15 a m  |
| Rockford and Fox River..... | * 4.00 p m | *11.10 a m |
| Geneva and Elgin.....       | * 5.15 p m | *8.45 a m  |
| Junction Passenger.....     | * 5.30 p m | *8.30 a m  |
| Lombard Accommodation.....  | * 6.10 p m | *6.50 a m  |

## WISCONSIN DIVISION.

Depot, corner West Water and Kinzie streets.

|                               |            |            |
|-------------------------------|------------|------------|
| St. Paul Express.....         | *10.00 a m | *7.15 p m  |
| Night Express.....            | * 5.00 p m | *5.30 a m  |
| Janesville Accommodation..... | * 3.00 p m | *12.50 p m |
| Woodstock Accommodation.....  | * 5.30 p m | *8.45 a m  |

\* Except Sunday. † Except Saturday. ‡ Except Monday.

## MILWAUKEE DIVISION.

Depot, corner West Water and Kinzie streets.

|                                  | Leave.     | Arrive.    |
|----------------------------------|------------|------------|
| Milwaukee Mail.....              | * 8.00 a m | *10.10 a m |
| Day Express.....                 | * 9.45 a m | *4.00 p m  |
| Evanston Accommodation.....      | * 1.00 p m | *3.30 p m  |
| Night Accommodation (daily)..... | 11.00 p m  | 5.00 a m   |
| Kenosha Accommodation.....       | * 4.10 p m | *9.10 a m  |
| Waukegan Accommodation.....      | * 5.30 p m | *8.25 a m  |
| Highland Park Accommodation..... | * 6.20 p m | *7.40 a m  |

Kenosha and Waukegan trains leave Wells street depot.

## PITTSBURGH, CINCINNATI AND ST. LOUIS RAILWAY.

Depot, corner Canal and Kinzie streets.

Ticket Office, 95 Randolph street.

|  |            |           |
|--|------------|-----------|
| Cincinnati Express .....                   | * 7.40 a m | *9.55 p m |
| Columbus Express.....                      | *12.25 p m | *9.20 a m |
| Cincinnati & Southern.....                 | * 7.40 p m | *7.25 a m |
| Lansing Accommodation.....                 | * 4.10 p m | *7.35 a m |
| Indianapolis, Cin. and Louisville Ex. .... | * 6.20 p m | *8.00 p m |
| Indianapolis, Cin. and Louisville Ex. .... | 8.00 p m   | 11.00 a m |

This time-table is run by Columbus time—twenty minutes faster than Chicago time.

## LAKE SHORE AND MICHIGAN SOUTHERN RAILWAY.

Depot, Van Buren street, at head of LaSalle.

Ticket Office, 56 South Clark street.

|                               |            |            |
|-------------------------------|------------|------------|
| Mail.....                     | * 6.00 a m | *8.00 p m  |
| Special New York Express..... | * 9.00 a m | *7.00 p m  |
| Atlantic Express (daily)..... | 5.15 p m   | 8.00 a m   |
| Night Express.....            | *†9.00 p m | *‡6.30 a m |

(Detroit and Grand Rapids Line.)

|                    |            |            |
|--------------------|------------|------------|
| Day Express.....   | * 9.00 a m | *8.00 p m  |
| Night Express..... | *†9.00 p m | *‡5.30 a m |

## CHICAGO, BURLINGTON AND QUINCY.

Ticket office, 63 Clark street, (opposite Sherman House.)

Union Depot, foot of Lake street.

|                                      |             |            |
|--------------------------------------|-------------|------------|
| Riverside and Hinsdale.....          | * 6.30 a m  | *9.00 a m  |
| Mail and Express.....                | * 7.30 a m  | *4.00 p m  |
| Pacific Fast Line.....               | *10.45 a m  | *4.30 p m  |
| Riverside and Hinsdale.....          | *10.00 a m  | *1.30 p m  |
| Mendota Passenger.....               | * 4.20 p m  | *9.55 a m  |
| Galesburg Pass. Evening Express..... | * 3.00 p m  | *8.10 p m  |
| Aurora Express.....                  | * 5.30 p m  | *8.30 a m  |
| Riverside and Hinsdale.....          | * 6.15 p m  | *6.45 a m  |
| Night Express.....                   | *† 9.00 p m | *‡7.35 a m |

## PITTSBURGH, FORT WAYNE AND CHICAGO RAILWAY.

Depot, corner Madison and Canal streets.

|                               |            |            |
|-------------------------------|------------|------------|
| Mail.....                     | * 5.30 a m | *5.40 a m  |
| Day Express.....              | * 9.00 a m | 6.00 p m   |
| Pacific Express (daily).....  | 5.15 p m   | *7.00 a m  |
| New York Express.....         | * 9.00 p m | *11.50 a m |
| Valparaiso Accommodation..... | 3.45 p m   | 8.40 a m   |

Connecting with the

## PENNSYLVANIA CENTRAL RAILWAY.

|                              |            |           |            |
|------------------------------|------------|-----------|------------|
| Leave Pittsburgh.....        | * 2.10 a m | 12.10 p m | *7.40 p m  |
| Leave Harrisburg.....        | 11.25 a m  | 10.45 p m | *2.40 a m  |
| Arrive at Philadelphia.....  | * 3.15 p m | 3.00 a m  | *6.50 a m  |
| Ar. N. Y. via Allentown..... | * 6.30 p m | .....     | *10.30 a m |
| Arrive N. Y. via Phil'a..... | * 6.30 p m | 6.48 a m  | *1.00 a m  |
| Arrive Baltimore.....        | * 3.25 p m | 12.30 a m | *9.00 a m  |
| Arrive Washington.....       | * 5.15 p m | 6.00 a m  | *1.00 p m  |

\* Except Sunday. † Except Saturday. ‡ Except Monday.

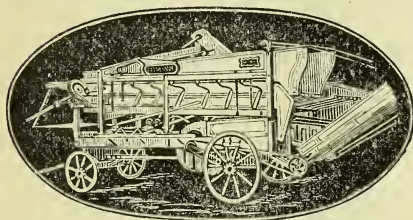




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## Threshing Machine

WITH 8 AND 10 HORSE

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Our goods have been very much improved recently, by making the *Bar WIDE*, as shown in the cut, which makes a 12 inch Wrench as strong as a 15 inch made in the ordinary way, and by using

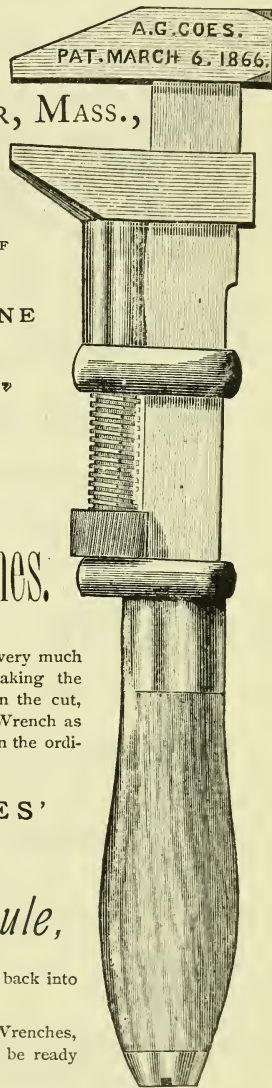
A. G. COES'

PATENT

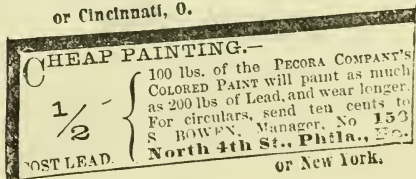
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|                    |                      |
|--------------------|----------------------|
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| 3-4 Plain Alpacs,  | 3-4 Oriental Lustre, |
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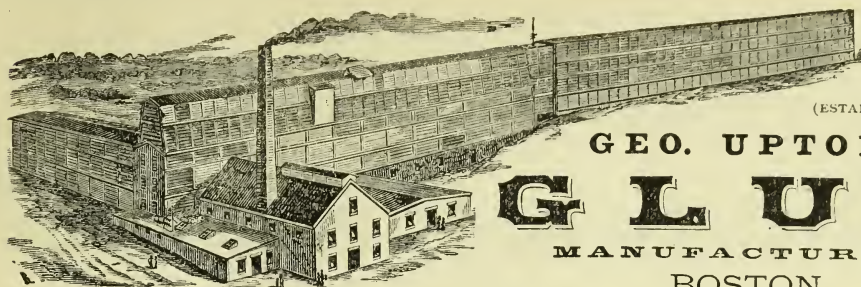
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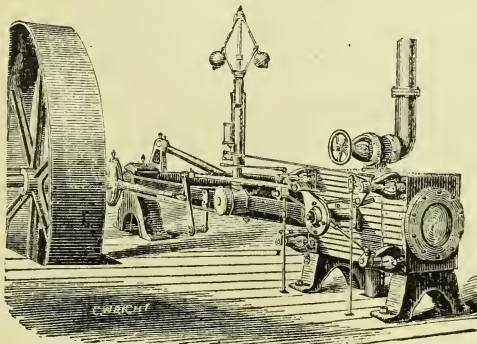
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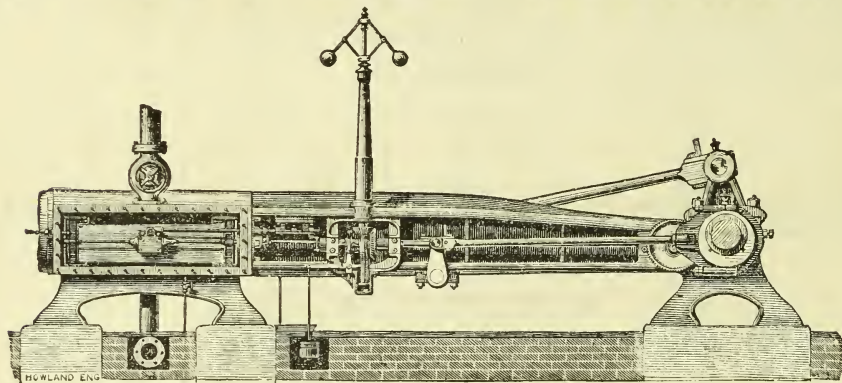
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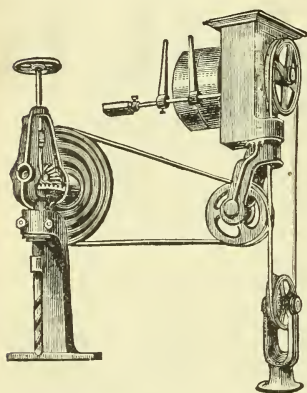
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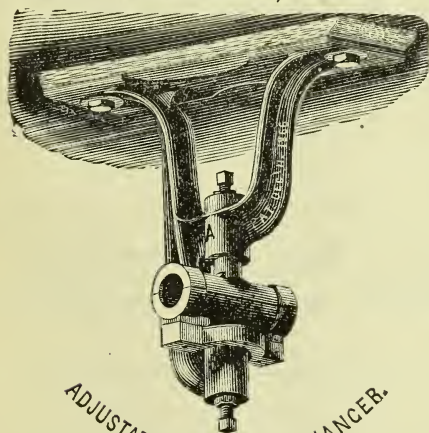
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TWENTY-THIRD AND FILBERT STREETS.

OFFICE AND WAREHOUSE:

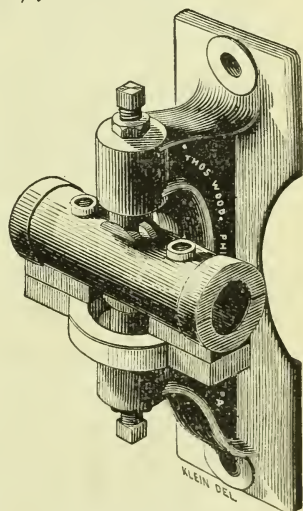
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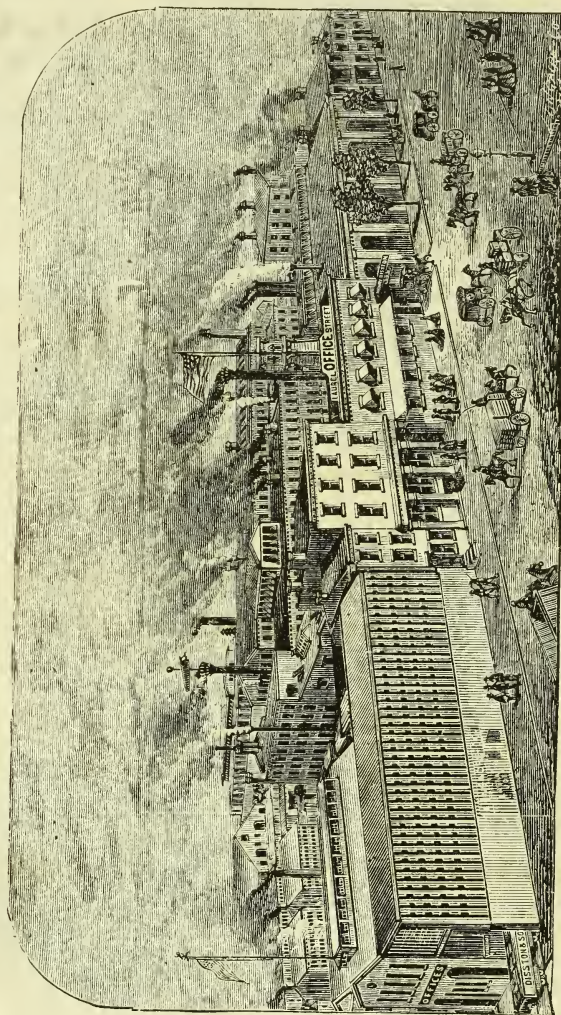
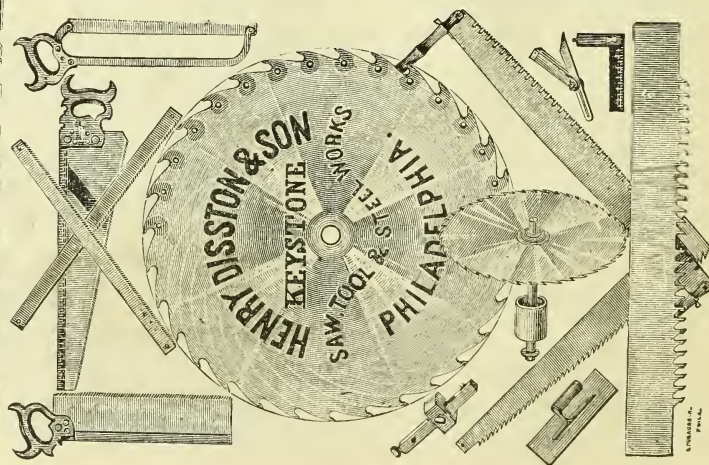
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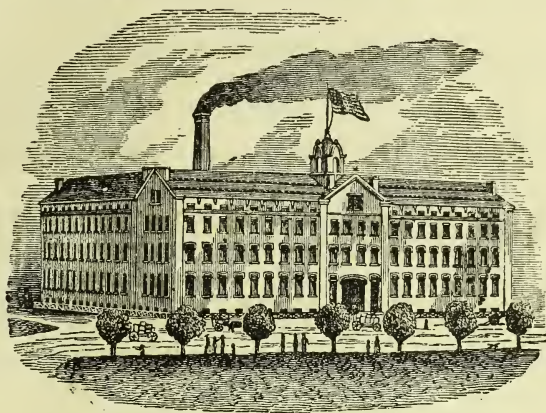
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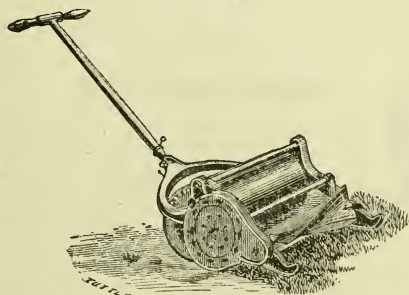
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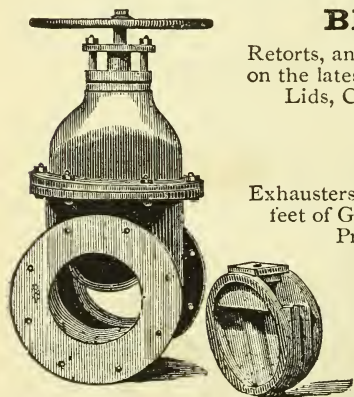
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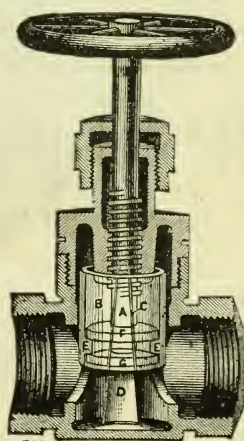
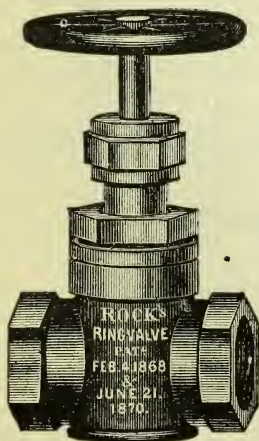
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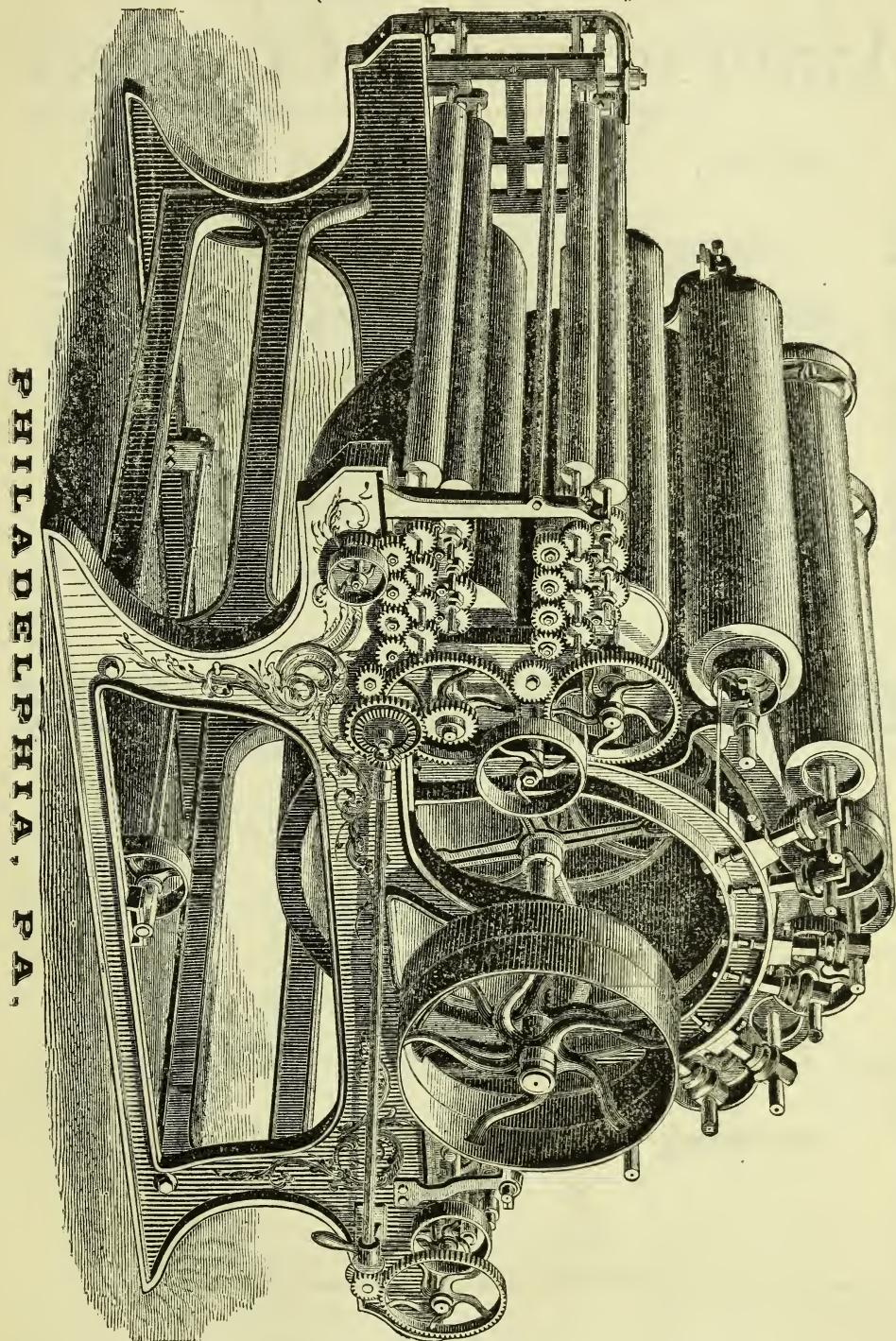
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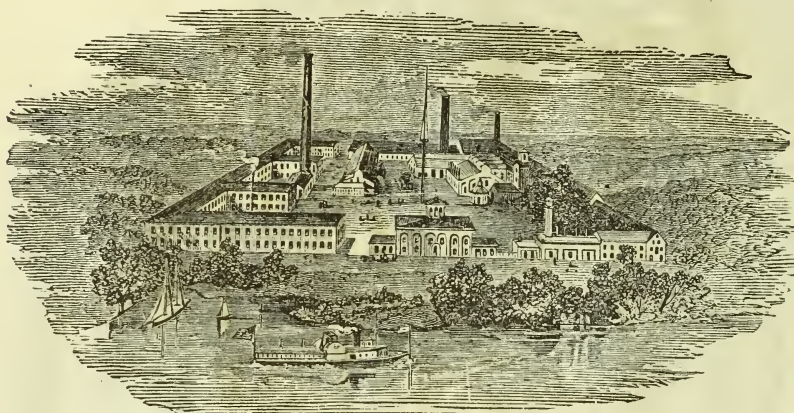
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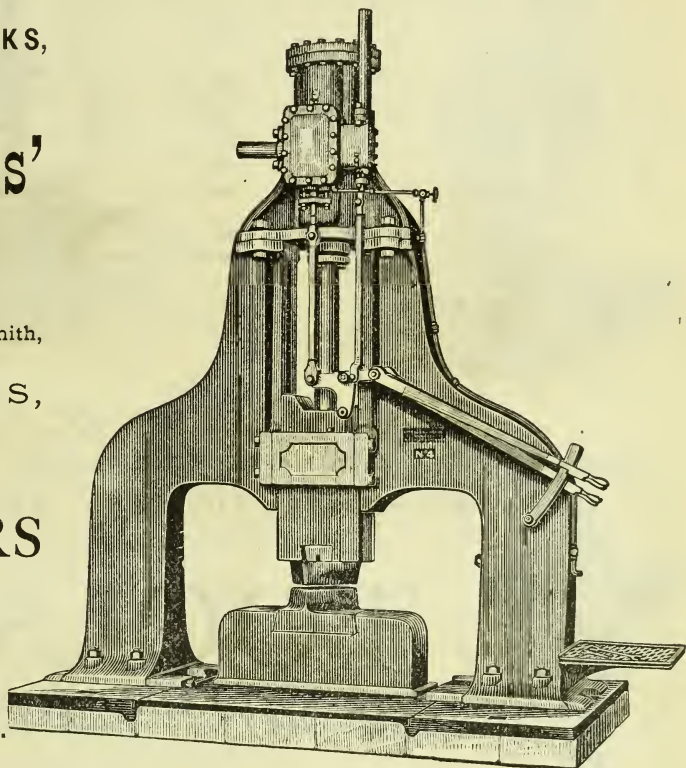
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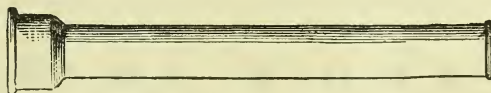
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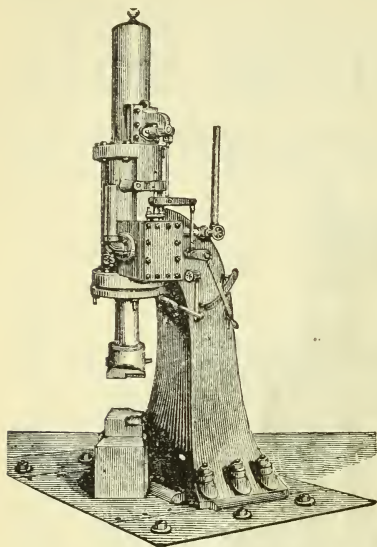
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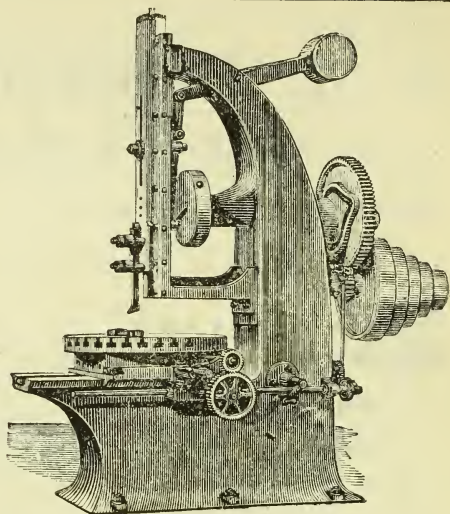
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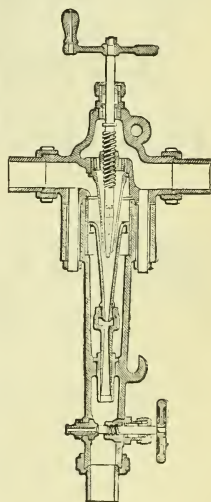
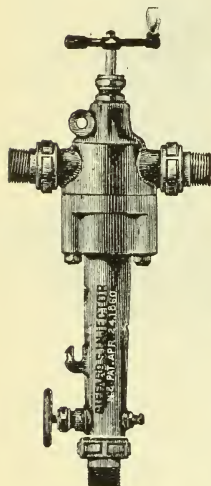
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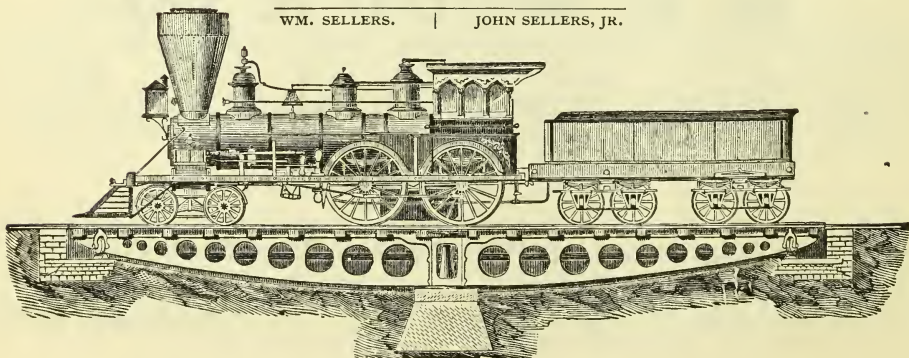


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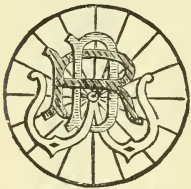
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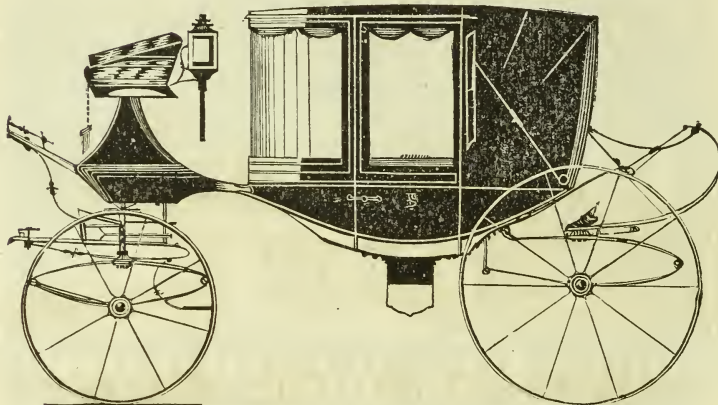
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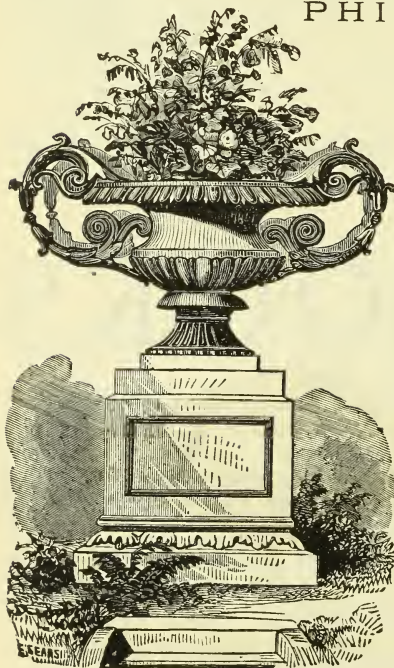
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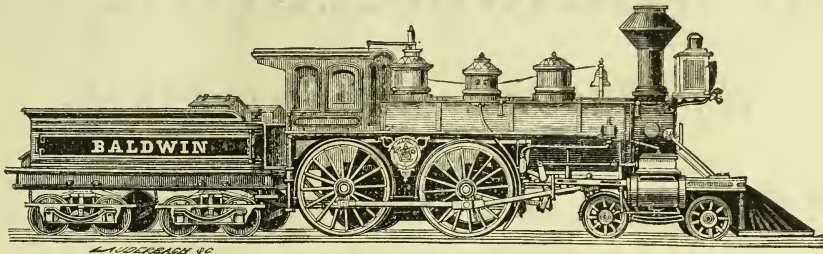
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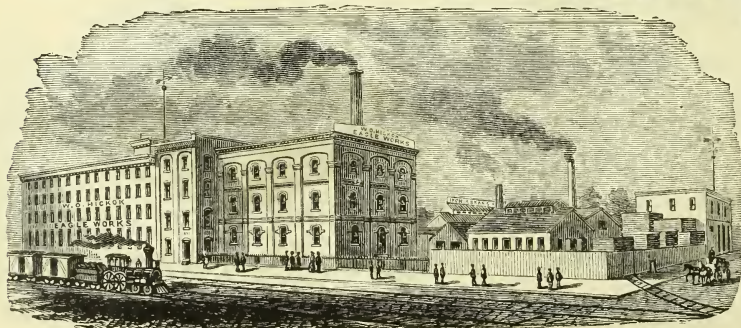
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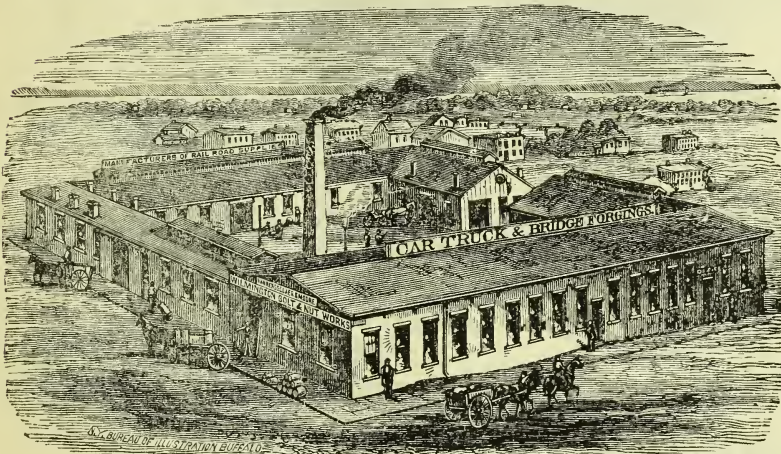
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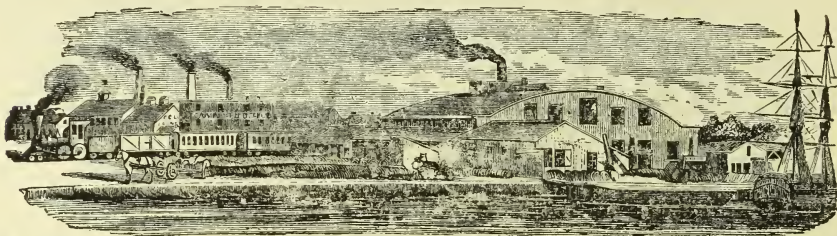
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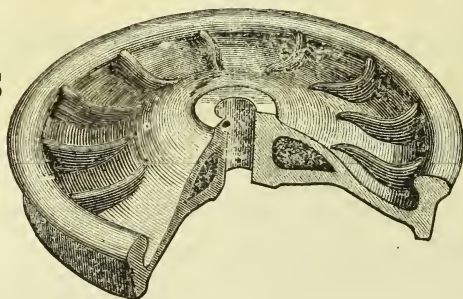


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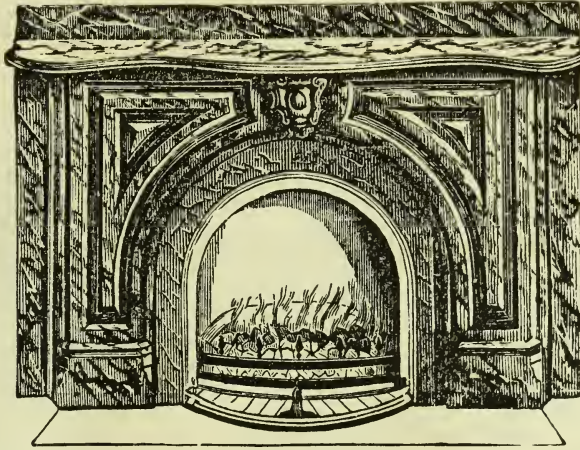
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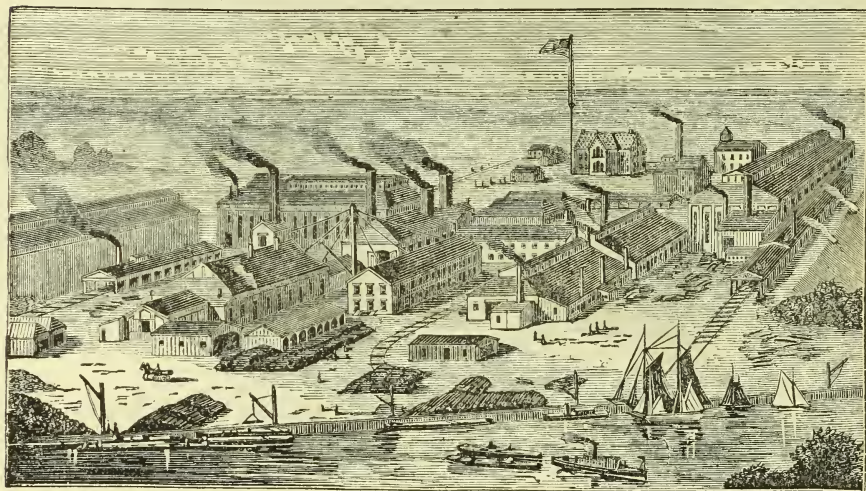
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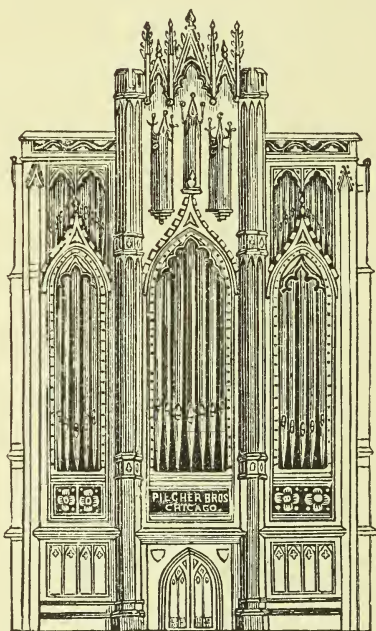
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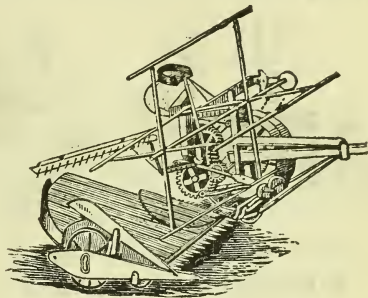
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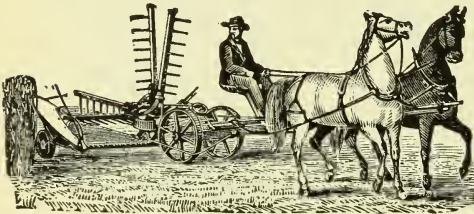
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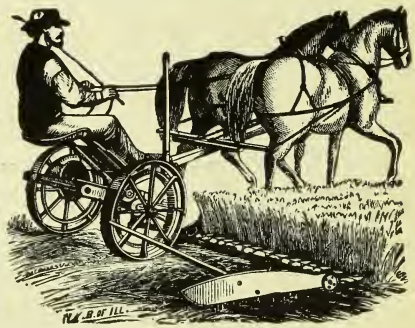
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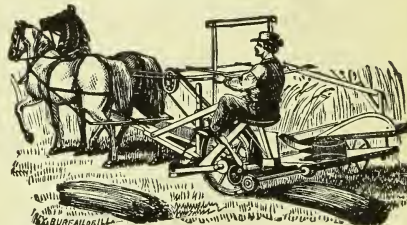
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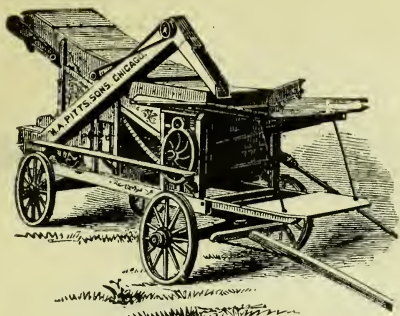
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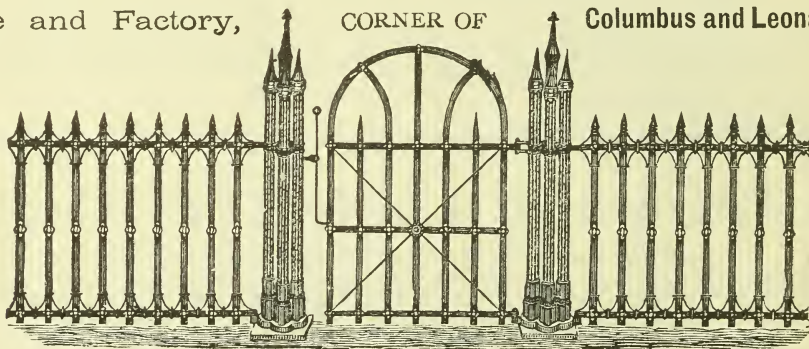
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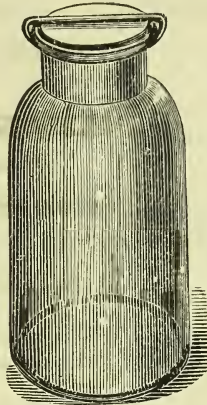
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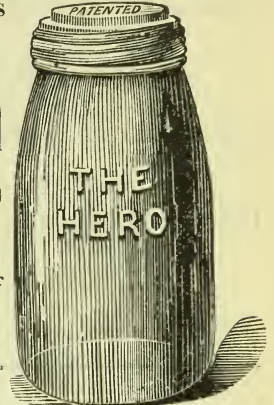
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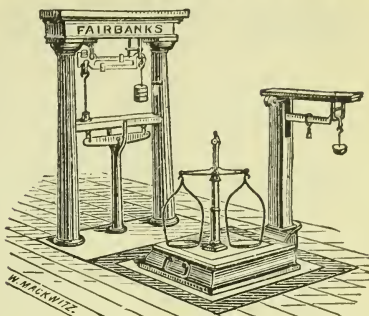
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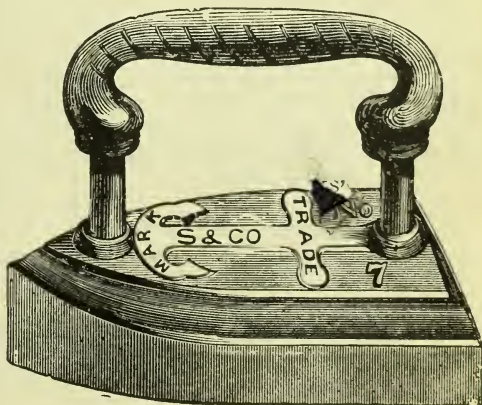
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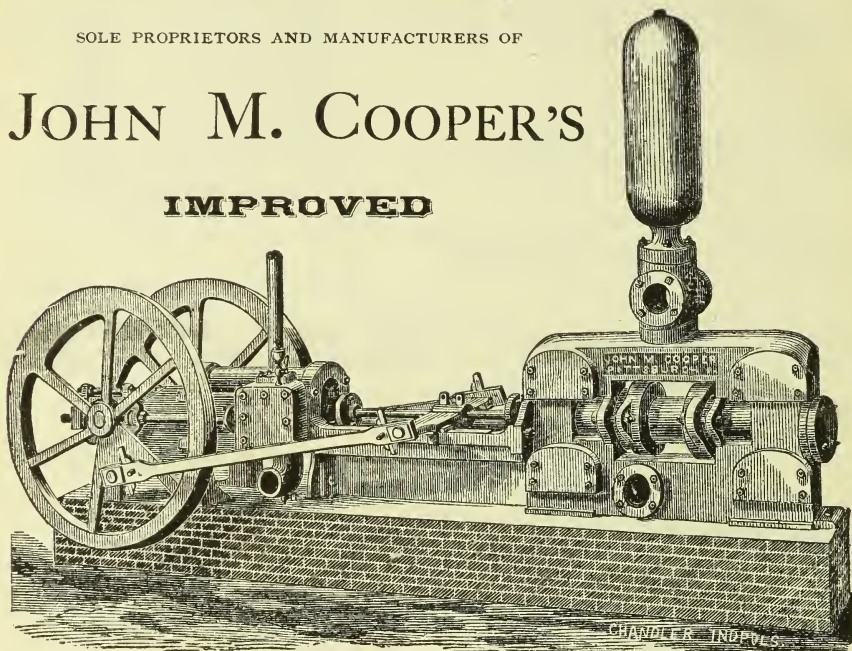


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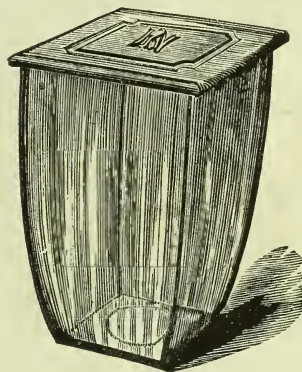
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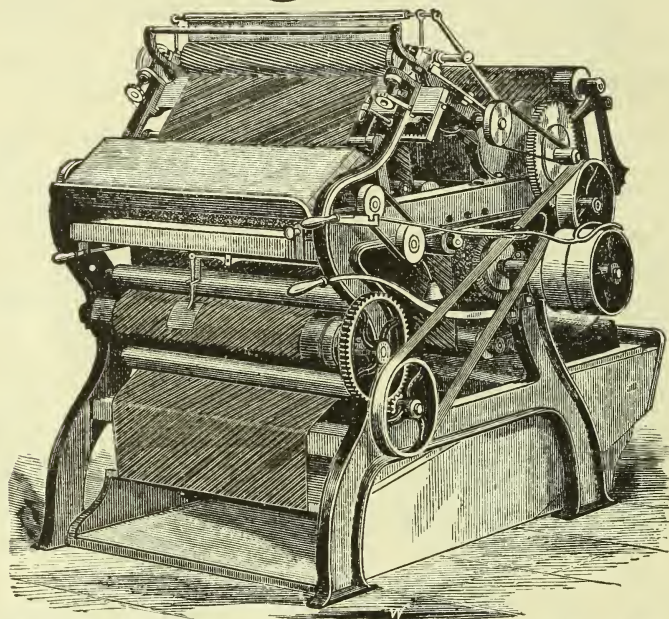
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